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GREGORY STRAGNELL, M. D.

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The Relation of Medical Education to Medical Progress*

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MEDICAL PROGRESS IN AMERICA.

The primary purpose of the medical school is to train practitioners for the medical profession. There are many byproducts of this primary intention, but as Huxley so clearly pointed out a generation ago, these are byproducts, whether one consider the service of the school to the public health, to medical research, or to any other related field of endeavor. All experience goes to prove that these byproducts will be greatest when the medical school conceives most clearly its fundamental purpose and bends its effort most directly to it.

While the development of a highly trained profession, like that of medicine, is directly dependent upon the character of its professional school, and while it is essential that the professional school shall keep clearly in view its primary purpose, it is none the less essential that medical education shall keep touch with the changing needs of the profession. To do this, it must take into account all those agencies of professional training that are closely related to its own field of service. Without this contact it is entirely possible for the profession to be educated away from a sound conception of its immediate needs and the steps by which they are to be met.

If, therefore, we are to expect a symmetrical development of medicine in the United States and Canada, and if the training of the profession is to be brought to a level worthy of the attainments of modern medicine, it is essential that those who have to do with the medical school shall conceive of it, not only in respect of its primary purpose, but also in relation to those institutions and agencies with which the training of the medical profession is so intimately connected.

The present time is opportune for a look forward toward the development of these agencies for the next decade. The last ten years have shown a notable advance in medical education. This result has come primarily from the leaders of the medical profession. Through them the American Medical Association and its Council on Medical Education have exerted a salutary influence to weed out the unfit medical school, to promote a sounder and more sincere medical education, and to raise the standard of medical practice. The epoch making report of Mr. Abraham Flexner, ten years ago, voiced in effective fashion the views of the wisest medical men in America. During these ten years the number of medical schools in the United States and Canada has been reduced by the elimination of the weaker and less promising. The requirements for entrance have been raised throughout the whole country, and the medical schools that remain now offer to students a medical education far in advance of that of a decade ago. Meantime the American College of Surgeons has conducted an intensive study of hospitals, and has started a movement which in a short time promises to bring into cooperation all the medical agencies in the effort to relate the hospitals of the country, in a fruitful way, to the needs of medical teaching, of medical practice, and of community service.

Another important gain has come through the work of the National Board of Medical Examiners. The medical tariffs maintained by our forty-eight States are the remnant of a time when no selfrespecting State could open its practice to all the medical schools of the country. There still exist schools whose graduates ought not to be admitted to medical practice in a State that maintains fair standards of admission to the profession. Nevertheless, it is most desirable that the well trained physician should be eligible to practice in any State. Recognizing the hopelessness of obtaining uniform legislation on this matter in all the States, the National Board of Medical Examiners, established three years ago, has maintained an examination of such high order and of such practical significance that already, in more than twenty States, the State boards have accepted the examination of the National board as admitting to practice in their respective States. In another five years we may well hope that the well trained medical practitioner may be able, by a single examination, to obtain the right to practise in any State in the

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*Anniversary address delivered before the New York Academy of Medicine, November 3, 1921.

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Union, a result of the highest importance to the States themselves and to the profession. The present medical barrier between the States tends to restrict the migration of the better trained men, and to offer an inducement to them to go into the practice of medicine in the State in which they were graduated. It is equally desirable that the reciprocity in medicine between Canada and the United States be complete.

Along with these important gains, brought about in the main by the various organizations of the medical profession, the cause of medical education owes something to the studies and to the financial support of the endowed foundations. The generous gifts from the General Education Board, from the Rockefeller Foundation, and from the Carnegie Corporation, have served some part, both in the stimulation of the professional spirit and in the upbuilding of vigorous medical schools. No doubt also the studies and the criticism on the part of nonprofessional men sympathetic to the ideals of the profession and interested in its purposes, has been a factor in this last decade of progress. Medicine today covers so great a field that even the highest medical authority is likely to view it from the point of view of the specialist. It may well be that the outlook of the layman over the problems of medical education may be helpful to those actually in the work of medical teaching and medical practice.

At the end of a ten year period of criticism and discussion, of selfexamination and improvement, the profession turns now to a constructive decade both in medical education and in medical practice. Whatever progress shall come in the profession in this period must come primarily through the medical school, not only because the medical practitioner receives in the school his training and his ideals, but also because in the medical schools are gathered the leaders of the profession; and progress, whether in education or in practice, will come through their leadership. It is, however, essential that those who are to lead in this constructive work shall have in mind not only the medical school, but those related agencies which must advance *pari passu* with the medical school if enduring progress is to be had.

THE AGENCIES OF MEDICAL EDUCATION.

The trained physician or surgeon of high character who is abreast of the medical science of his day is perhaps the finest product of our civilization. The professional school in which he is prepared is the most expensive form of education in existence. If society is to avail itself fully of medical knowledge and skill, this will be accomplished, not by cheapening medical education, but by such cooperation and coordination of the social agencies involved as will bring the benefits of this skill within the reach of every member of the community. The immediate agencies through which this result must be reached are these:

1. The undergraduate medical school.
2. The postgraduate medical school.
3. The hospital with its clinics.
4. Medical research.
5. Organization of the medical profession upon a cooperative basis.

To treat these subjects in detail is the work of the medical expert. All that the layman can hope to do is to view them in educational perspective and to emphasize the need for an outlook generous enough to include all those formal agencies of education upon whose integration the medical progress of the next decade will depend.

THE UNDERGRADUATE MEDICAL SCHOOL.

Medical education has been conceived of in the United States and Canada almost entirely in terms of a medical school that shall take the candidate for the profession at some agreed level of general education and graduate him in four years licensed to practise medicine. This is only part of the formal professional training that the school must offer. The graduate in medicine often stands in greater need of instruction and is more ready to profit by it than the undergraduate student.

In the decade just past, so much has been done to establish a sound standard of admission to the undergraduate medical school that little needs to be said on this matter. No doubt, in some parts of the country requirements for admission were raised more rapidly than the educational systems of the regions were prepared for.

But that ground has now been occupied. It may be assumed that the medical candidate of the future will be required to have a general education equivalent to the first two years of college work, and that this education will include certain fundamental scientific studies upon which medicine rests. Three matters of fundamental policy affecting the undergraduate school still need the most thoughtful attention in the immediate future:

a. Improvement in the quality of medical teaching.

b. A thoroughgoing reform of the medical curriculum.

c. A fair determination of the number of medical schools needed in the country and adequate support for these schools.

Perhaps no defect in the medical school makes a sharper impression upon the lay visitor, familiar with the quality of teaching in our more serious colleges, than the lack of good teaching, and particularly in the teaching of professional subjects. Fundamental sciences, such as chemistry, physiology, anatomy, and pathology, are ordinarily taught by trained teachers; clinical and surgical subjects, on the other hand, are taught by men in practice, oftentimes experts in their fields, but having no training in the art of teaching, and often oblivious to the fact that students are able to digest only a modicum of what is offered in lectures. A notable improvement could be made in medical teaching, if the deans of the medical schools would themselves suggest to clinical and surgical teachers some simple principles of the art of teaching. The medical school needs the great clinician and the great surgeon. No other men can so touch the imagination and inspire the hope of the medical student, even when he comprehends but a part of what he hears. But it would vastly improve the medical school if the clinician and surgeon could bring themselves to consider the art of teaching as also within their field of educational activity.

The reform of the curriculum of the undergraduate medical school is one of the most pressing questions of present day medical teaching, and its accomplishment will have a larger bearing on the progress of the profession than any other single action. The state of the medical curriculum is quite analogous to that of the engineering courses of study. In the engineering school the student spends his first two years mainly in the study of certain fundamental sciences—mathematics, chemistry, physics, and mechanics. In his last two years he undertakes to apply these sciences to the varied problems of modern engineering. Fifty years ago the course was a simple one. In that interval, engineering applications have become enormously differentiated. In the endeavor to fit students for engineering practice, the load upon the student has been continually increased until it has become almost intolerable, and what is more serious, the fundamental sciences have become so dissociated from their applications that in many cases they cease to be effective engineering tools. For example, notwithstanding all the wonderful gains that have come through chemistry and physics, mathematics still remains the most facile tool that science can put in the hand of the engineer. But scarcely one engineering student in a hundred learns to use it as a tool. He keeps his mathematics and his engineering in separate compartments, which is exactly what the school taught him to do.

Quite the same process has gone on in the medical school. The medical student takes up the study of certain fundamental sciences—anatomy, physiology, pathology, chemistry—upon which he undertakes to build the superstructure of professional training. The applications of medical science have, however, become so varied and so complicated, that the medical student, like the engineering student, is not only called upon to carry an impossible load, but his fundamental sciences are in different compartments from the applications which ought to illustrate and make clear the sciences themselves. The student learns anatomy by a tedious process of dissection upon which he spends a large amount of time, but he has a very good opportunity to forget most of it before he sees, in the practice, the application of his anatomical studies. These fundamental sciences can be taught, not as something separate from medical practice, but as a part of it. The fiction that the medical student can be prepared for medical practice by learning a mere fragment from every field of medical science ought to be definitely given up.

The reform of the medical curriculum along some such lines as are here indicated can be carried out only by medical teachers and medical practitioners, but it can be carried out by them only if they have an educational perspective and an appreciation of the art of teaching. The medical curriculum of today represents the conception of teaching of a half century ago modified by certain laboratory practice superimposed upon it. What is needed is to abandon this conception entirely and to plan a medical curriculum afresh in the light of present day knowledge of medical science and of medical education. No other one step will do so much for medical progress as such a readjustment of the medical curriculum. It will require technical knowledge and teaching ability of a high order to compass it, and the greatest difficulty will be found in overcoming the rigidity and inertia of the existing order of things. Teaching institutions are inelastic; to try an educational experiment, it is almost necessary to found a new institution. Whatever agency may undertake this task must have the courage to do two things—first, to reduce the load laid upon the student to a point where he may have time to think and to digest in some measure the studies with which he is concerned; and, secondly, to scrap the present rigid curriculum and reconstruct a new course of studies in which anatomy and physiology and chemistry and pathology are not separate and distinct things to be taught at different times, but are parts of one thing to be learned and applied as the exigencies and the opportunities of the lecture room, of the laboratory, and of the hospital may provide. Perhaps only a new medical school will have the courage and the initiative for such a step. The new School of Medicine about to be founded at Rochester, New York, under conditions of exceptional freedom from traditional limitations, could set itself to no finer task than the reconstruction of the course of study of the undergraduate medical school.

A layman in medicine naturally hesitates to propose in detail a reconstructed course of undergraduate medical study. Nevertheless, it must be clear to every one that the task of reconstruction is educational, not medical. It must be clear also to every medical teacher that the weakest parts of the present medical teaching are the courses in anatomy and pathology. These are elaborately taught to every medical student without affording him any opportunity to see the application of anatomical and pathological knowledge to the practice of medicine and surgery. The process is like teaching forestry by giving the student elaborate courses in botany before taking him into the forest.

The practical remedy for this situation is to reduce the amount of theoretical instruction in the first two years, and to change the character of the teaching so as to make clear the fundamental facts, while at the same time starting the clinical instruction with the very beginning of the course. The student should learn his anatomy and his pathology through his clinical training—not reverse the process. No other reform in medical teaching approaches in importance this one.

The question how many medical schools are needed for the country is not one that comes before the individual school. Each school is occupied with the problems of its own environment. To those, however, who are studying medicine from the viewpoint of the whole country—and the United States and Canada are medically one country—this is a very real question, and its right solution will affect in large measure, not only the ability of the country to educate the requisite number of physicians and surgeons, but will determine also the quality of the great body of practitioners.

In this matter, the ten years of experience through which we have just passed has been most illuminating. Following the rigid classifications instituted by the American Medical Association through its Council on Education and the subsequent raising of standards, and partly in consequence of discussions such as those of the Flexner report, the weaknesses of the medical schools of ten years ago were clearly pointed out. The last fifteen years have seen a diminution in the number of medical schools from one hundred and sixty to eighty-five. Most of the schools that have gone deserved to die. Some were frankly commercial, some were hopelessly inadequate, some were honest but misguided. The mortality among these schools has been in the main to the glory of God and to the good of the State. It was a cleaning of the Augean stables that had to be done before sound progress could be assured. Nevertheless, this reduction of teaching agencies has not been an unmixed blessing, and the results viewed from the needs of the country and of the profession suggest some considerations that should have weight for the future.

In the first place, it is clearly not possible to solve the problem of medical education in the United States by building up a small number of richly endowed and highly equipped medical schools. Necessary as this is, and desirable as is the influence of such schools upon medical progress, the great mass of medical practitioners of the next generation are being educated today, and will continue to be educated in the future, in a number of more moderately endowed medical schools, numbering approximately one hundred and scattered throughout the country. Unless these schools are all brought to the point where they can offer a decent medical education upon the basis of modern medical science, the majority of the practitioners of medicine of the next generation will be very little in advance of the similar majority of medical practitioners today. And so long as that situation holds, the service of medicine to the community and to society will rise very little above the ideals and the capacity of the typical practitioner. Those, therefore, who hope to promote medical progress as a whole, through the agency of medical education, must see to it not only that there are a few preëminent centres of medicine, but also that the great mass of medical schools that survive shall be placed, through the proper means, upon such a foundation as will enable them to train the students who come to them in sound methods of medical theory and practice.

The practical bearing of this upon the present situation lies in the fact that the reduction of medical schools may go too far. The mere weakness of a particular medical school is not always a sufficient ground for its abandonment. It may be better for the cause of medicine and for the service of the public to strengthen such a school, by all legitimate means, so that it may come to the point where it can offer a modern medical training. In other words, the determination of the number of medical schools that the country needs is not entirely a matter of statistics. It is partly a matter of medical and social statesmanship.

The abandonment of a medical school in a community where medical education has long been established is a matter to be decided upon wider grounds than merely those of the equipment and facilities at the moment. Old medical centres like Louisville, for example, have acquired by long history a certain medical constituency which is itself an asset. It may well be doubted whether the abandonment of medical education in such a city could be looked upon as other than a misfortune. Dr. William H. Welch has pointed out with rare clearness and unselfishness, that a second medical school, in addition to the Johns Hopkins, is justifiable in the city of Baltimore and is entitled to support.

In the abandonment of medical schools which has taken place in the last ten years, certain sections and certain communities, in which weak medical schools existed, have been left without agencies for medical education. In some cases this has occurred in centres of large population, and in such cases there has been a notable rise in the number of cults seeking by one device or another to undertake the practice of medicine. Defective as was the training in many of these schools, the disappearance of certain of them has opened a gate for a huge flood of medical impostors, and points to the conclusion that in some of these cases it would have been wiser to strengthen a weak medical school than to abandon it.

An unexpected outcome of the abolishment of a long established though weak medical school in certain communities has been that no focus of influence for medical leadership remained, and in the absence of some such rallying point, medical ideals suffered. It may well be that the way to reestablish sound medical leadership in such places lies through the local medical association or academy of medicine. No doubt in many communities, the way to medical advance lies in cooperation with the local medical society or association which, as a rule, contains in its membership the leaders of the profession. Medical education will, in the long run, make its advance through the men of the medical profession. It will not be imposed upon the profession from the outside. A closer cooperation with medical organizations in various communities offers an opportunity for progress hitherto little used.

Those who have to do with medical education as a whole, whether through the great medical associations, or through the agencies that study and in some measure support medical education, will need in the next ten years to aid not only the few great medical schools, but to aid, so far as may be, in the effort to place medical schools in general on a basis sufficiently secure to offer to medical students a modern training. The next ten years must be a period of construction. Part of that work of construction must be to restore medical schools in some communities where they have been abandoned, and to aid in other communities to strengthen weak schools that sincerely seek their own improvement.

THE GRADUATE SCHOOL OF MEDICINE.

Medical education has discharged only a part of its legitimate function when it has taken the young candidate at the end of two years of college work and has offered him a four years course culminating in the degree of doctor of medicine. This is all preliminary to the practical training he is to get as an intern in a hospital or as an assistant to some physician of experience and standing. In no respect has our medical education in the past fallen so far short of what is necessary, as in the opportunities offered to graduates in medicine to strengthen their knowledge either in general medicine or by training in some special branch of medical practice. Attempts to meet this demand have been made in various cities by postgraduate schools or polyclinics maintained usually by groups of physicians, oftentimes at great expense of time and even of money to themselves, but offering at best fragmentary and unsatisfactory facilities to the medical graduate. The experience of our medical officers in the great war brought to public knowledge, in startling and unexpected fashion, the enormous need of additional training for the men already in practice. A large proportion of medical practitioners were found to be in ignorance of the elementary tests and methods of modern medical science. The medical profession itself was startled at the situation revealed by the great war.

Not only is there great need for facilities in medical instruction for men already graduates in medicine, but these practitioners constitute the most fertile soil in which to plant the seeds of medical teaching. This pressing need cannot longer be neglected, nor can it be left to desultory opportunities and facilities of voluntary associations of physicians unsupported by community cooperation. The problem of graduate instruction must in the future take its place alongside the problem of the instruction of candidates for the medical degree. The two are not separate problems, they are parts of one problem. The school for the training of graduates ought to be a part of, and directly related to, the undergraduate medical school. The plan of the University of Pennsylvania to carry out this conception is a contribution to medical education. It undertakes to present in a single institution, not only the facilities of undergraduate instruction, but also the opportunity for the graduate student to obtain his training under conditions that shall recognize his needs and enable him to work in company with men of his own advancement rather than to take his chances of picking up what he desires in desultory courses or in the company of a mass of undergraduate students. The next decade must see a development of the graduate school in the larger medical centres, if the medical profession of this generation is to be put abreast of the state of medical science.

THE COUNTRY DOCTOR.

Scientific medical practice is rooted in the laboratory and in the hospital. The training of the medical student today prompts him to rely more and more upon the scientific tests of the laboratory, upon the facilities which good nursing and hospital care afford, and upon the reinforcement of his personal judgment by the common opinion of the members of a group or clinic, whether small or large.

This process has accentuated the tendency, long noted, which brings a growing proportion of medical graduates into the cities, towns, and fair sized villages. The old time country doctor who practised medicine over a whole county is disappearing, and the modern trained man finds less and less to attract him in the effort to deal with the medical practice of a wide region on his own resources and knowledge, without the aids to practise which the modern laboratory and the modern hospital have taught him to value so highly. Practitioners of medicine, in other words, are deterred today from going into the country, not only by the meagre financial return and the hard work, but also by reason of the fact that medicine practised under such conditions no longer fulfils the ideals of the medical practitioner. The isolated country doctor, necessary as he has been, fruitful as he may be in the prevention and cure of disease and in the relief of suffering, works under conditions that must be unsatisfactory to men trained in the modern medical school. This reason will weigh most with the more capable graduates of the medical school. The result is, that the countryside takes a constantly diminishing proportion of medical men from the schools, and those who come to country practice are likely to be among the less alert and less scientific minority.

The operation of the medical tariffs between the States has worked in the same direction. The graduates of the great medical schools in the cities of the eastern States and of the central west find it easier to enter the practice of medicine in the States in which they have been educated. The work of the National Board of Medical Examiners promises to bring about in a short time a situation under which a well qualified graduate may pass a single examination admitting to practice in any State, a situation that will go far to remove this limitation.

The difficulty of supplying properly qualified men to the rural regions has been a matter of earnest debate in the medical societies and among thoughtful leaders of the profession for some years past. It has been seriously proposed that certain medical schools be kept on a lower plane of instruction with the notion that the graduates of these schools should form the recruits for the country medical practitioners.

This problem, as it seems to me, can be solved only by a frank facing of the conditions. Modern medicine cannot be conducted at its proper level out of touch with the laboratory and the hospital. Modern trained physicians will not be satisfied to undertake the diagnosis and treatment of disease independent of these aids. Furthermore, those who dwell in the rural parts of the country will demand, and are entitled to receive, medical treatment that shall be abreast of the medical progress of the day. The problem must be met, in my judgment, not by seeking to perpetuate the rôle of the old time medical practitioner, but by reorganizing medical practice in the country so as to meet modern conditions.

This can be accomplished in some such way as the following: Any moderate sized town and the country surrounding it within a radius of perhaps ten miles can support a small but well conducted hospital. This hospital may well form the centre of activity of the three or four physicians and surgeons who can find a reasonable living in the practice of the town and the area immediately surrounding it and accessible from it. The small hospital becomes, under these circumstances, the centre of medical service, not only for the town itself, but for the countryside adjacent, and, what is equally important, it gathers to itself a small group of medical practitioners who together can carry on the diagnosis and treatment of disease under scientific conditions. The visitation of patients ten or fifteen miles away has been greatly simplified by the construction of good roads and the development of the automobile. Indeed, the process which has just been described is already in the making. To bring about its general application both in the United States and Canada, there is needed first of all, a fair spirit of cooperation among medical men themselves, and secondly, an intelligent civic cooperation between the towns and the countryside adjacent to them. No doubt the adoption of some such program can be hastened by a reasonable number of demonstrations in different parts of the country illustrating what can be done by intelligent cooperation of the medical profession joined with a civic cooperation between town and countryside.

However this project may be worked out, it should at least be understood clearly that the notion of supplying well trained doctors for the city and doctors less well trained for the country is neither justifiable nor can it be made to work. The practice of medicine is not any longer an individual enterprise. Every citizen of the nation, whether he live in the country or in the city, is entitled to receive the best medical treatment that the progress of science can offer. Medical practice in the country must be solved upon this basis, and it can be so solved by an intelligent cooperation in the profession itself and among the citizens of a rural district desirous of sound medical service. Furthermore, these results are possible at a cost within the limit of the means of the ordinary selfrespecting citizen.

It goes without saying that there are regions so remote, and so sparsely settled, that the organization of medicine along the lines just indicated would not be possible. Such regions must be dealt with in other ways.

The United States has today become so thickly settled that, for the greater part of its area, medical practice can be reorganized so as to fulfil the requirements of modern medicine and to meet the needs of the dweller in the countryside, and it is from such a point of view as this that the problem of the practice of medicine in the country is to be approached.

THE HOSPITAL AS AN EDUCATIONAL AGENCY.

Circumstances of human nature and of modern life tend to obscure the realization of the truth that education and science and devotion to human service are not separate and unrelated things, but parts of one human force. In the modern hospital society aims to realize the fulfilment of this ideal in its most concrete and attractive form. The primary purpose of the hospital is to serve those who are ill and needy, and to prevent, so far as possible, unnecessary illness and suffering. But all experience shows that the hospital can accomplish this primary purpose of human service best when it joins hands with science on the one hand and education on the other.

The teaching function of the hospital is exerted along two lines. More and more in each community the hospital is becoming the source of information touching the prevention of disease and public sanitation as well as the resource for the relief of the individual upon whom disease has fastened. Hospitals will become increasingly agents of public education in health in proportion as their staffs come more and more to represent the highest training of the day in medical science and in medical practice.

In the second place, the hospital is an essential part of the medical school, both graduate and undergraduate. No patients are so well served as those of the hospital where the members of the staff are dealing day by day with alert, eager medical students. From whatever point of view one considers the medical school and the hospital, it is clear that their purposes are so related that medical instruction cannot be given successfully except in relation to a hospital, and a hospital cannot reach its highest usefulness without taking some responsibility for the education both of the public, of the medical student, and of the medical practitioner.

The effort to secure this intimate relation has been one of the difficulties in the endeavor to place medical instruction in America upon a sound basis. Our medical schools and our hospitals began independently. As a rule they have separate boards of government. The members of these boards have hitherto conceived of the hospital almost entirely from the point of view of its care of the sick. In some cases, even among well known hospitals, boards of trustees have been willing to conduct an institution which was little more than a boarding house or a free hostel for rich and poor. Not infrequently the hospital lacked intelligent medical direction, oftentimes its staff has represented a group chosen on personal grounds rather than on the basis of medical knowledge and skill. The obligation to offer in the hospital the best practice that the medical knowledge of the day could offer has not always been taken seriously. Still more frequently, trustees of hospitals have looked askance at the applications of the medical schools for the admission of their students to facilities for study in the hospitals.

With the improvement of medical schools this attitude is changing. Those who are charged with the responsibility for the conduct of hospitals are coming to realize that, while the primary purpose of the hospital is to serve the sick, this service can be rendered in its best form when it is conceived of in terms of modern science and of modern medical education.

That the trustees of hospitals should have been more or less confused between the desires of the medical schools and the recommendations of their own medical advisers is most natural. Such a result was inevitable in the process of medical development through which we have gone. The medical school was, until recently, a proprietary institution in our country. Medical teaching was a privilege, sometimes a perquisite, of the medical practitioner. Under such a condition personal interest clashed constantly with the sincere and earnest devotion so often present. Positions as medical teachers and as members of hospital staffs had a direct relation to the income of the medical or surgical practitioner. Under such circumstances, the control of the medical schools, no less than the control of hospitals, was contended for by groups of practitioners oftentimes well intentioned, but inevitably influenced by questions of personal interest. The lay trustee of a hospital naturally followed the advice of his medical adviser, who might or might not be disinterested.

Slowly in the last twenty years, under the leadership of the wiser and abler members of the profession, both the medical schools and the hospitals have been lifted out of many of these complications; their trustees have come in contact with the leaders of medicine, and it may fairly well be assumed that the next decade will see the relations between the medical school and the hospital placed upon such a basis that each will seek to do its share in the work of education, and that this shall be done without detriment to the fundamental purpose of either.

In the same sense that the hospital is an educational agency, it is also an agency of research. Just as that hospital best serves the sick which chooses a staff representing the highest order of medical ability and which opens its doors and its sick rooms to the medical teacher, so also that hospital serves the sick best which turns a hospitable face toward medical research. No medical staff will keep abreast of the science of the day which does not seek to offer new applications of that science. In all hospitals, there pass under the eyes of the medical staff every year cases whose study and elucidation will advance the practice of medicine.

While the obligation of the hospital to education and to research is clear, and while the aims of teaching and of human service can be best carried out by an intimate relation between the medical school and the hospital, it would be folly to forget that as the primary aim of the medical school is to teach, so the primary aim of the hospital is the service of suffering humanity. Not every hospital can embark on the program of medical teaching or of medical research. In a small community, the hospital board does wisely to avail itself of the best medical skill to be had, and to offer to members of its staff only those facilities for teaching and for study that are consistent with its primary obligation. To the real teacher or to the true man of research, the sympathetic attitude of the hospital trustees means more than mere appropriations of money. Where the board of trustees has an enlightened and sympathetic attitude toward the devoted and interested member of its staff, there will always be a way open to the true teacher or to the true investigator, even though the hospital trustees decide to apply their income to the support of those things which constitute the primary purpose for the existence of their institution. Not every practitioner can teach; many good physicians and surgeons will never advance the cause of scientific research, but the encouragement of a liberally minded board of trustees toward these great by products of the hospital will do more than mere money to call forth the efforts of their best men.

The history of the last two decades indicates that both the teaching side and the research side of the hospital are likely to be stimulated by the formation of special units attached to or connected with the hospital and working in limited fields of medical study. The general hospital is not prepared to deal with all classes of disease; for example, certain of the metabolic diseases like diabetes. In the first place, such diseases tend to become chronic. In the second place, they require an extensive laboratory and diet kitchen for their diagnosis and treatment. If the poor man who has diabetes is to be rescued from his situation, he and his household must be taught how to prepare his food. In a word, if this group of diseased persons is to be successfully treated, it can be effected best by what might be termed a metabolic unit attached to and intimately related with the hospital. Such units have already grown up about a few of the hospitals of the country, their staffs containing clinicians, laboratory workers, and dietitians organized with a view to dealing with the problems and needs of this class of diseases. It may well happen that, as the function of the hospital in the community comes to be better understood, there will gather about certain hospitals one or more of these special units, and that through their agency and through that of the hospital itself, the common contribution to the relief of diseased humanity, to education, and to research may be notably enhanced.

MEDICAL RESEARCH.

The part that research ought to play in medical education is so necessary and so vital, that its importance cannot be overestimated. On the other hand, socalled research offers the readiest opportunity for exploitation which our institutions of learning contain, although this process has not reached the same stage in the professional school that it has reached in the college and university. Every college and university covets the reputation of being a centre of research. It is more anxious that its teachers shall have the name of conducting scientific investigations than that they should be able to teach fruitfully and successfully. The result of this striving is that the thing which ought to be the greatest inspiration toward good teaching has become only too often an excuse to escape the primary duty of teaching.

Research in its best sense means that patient, discriminating, and skilful pursuit of knowledge through which minds of high order, starting from the proved facts of science, extend the domain of knowledge into the unknown. To this extraordinary service only the few can attain.

Behind this skirmish line of the great discoverers comes a much larger body of men also working in the true spirit of the investigator and entitled to be considered genuine leaders of research. They are not equal to the great and original discoverers, but they are able to appreciate and to translate the work of these leaders. They verify and extend and apply the work of the great discoverers. They form the first army of occupation in the campaign against ignorance and in the extension of our knowledge of truth. If their service is not as spectacular as that of a Newton or of a Pasteur, they are nevertheless animated by the same spirit and breathe the same air. They have gained by hard work intimate knowledge of their respective fields, and they make possible the onward march of knowledge and the application of research to the complex problems of our life and of our civilization.

There is still a third line, who also are entitled to recognition as genuine men of research. These are the men who, having come to a fair mastery of the methods and facts of science in a given field, apply themselves to the testing and developing of this or that detail. Their work does not involve great originality, but it includes accurate knowledge of their subject and a technic sufficient to take up and elucidate a doubtful process, to prove the truth or falsity of a proposed theory, or to repeat the work of one of the masters with such thoroughness as to settle completely a disputed question. This third group forms the main army of research. They are the common soldiers of science.

Behind the generals, the captains, and the private soldiers, there comes a numerous body of followers who enlist under the banner of research, but who have neither the intellectual endowment nor the thirst of the spirit requisite to give them a place among the great investigators, nor yet the power of concentration and the grasp of the technic of science to enter into the first line of advance. They lack, furthermore, the patience to do the hard work and the earnest study necessary to become a common soldier of the research army. They belong to the great mass of irregulars, who join the army of research because they are not strongly drawn in any other direction and research is today a word to conjure with. To be a good teacher involves hard work and hard study. One can dally with research without a large amount of work. In the eyes of the public there is no clear distinction between the man who is a genuine soldier of research and one who is playing at research; or, if not playing, at least pursuing some scientific game in a routine fashion.

Most institutions may well hope to include among their instructing staff some men who are at least worthy to be reckoned as true private soldiers of research. Such a man will be of enormous value to his institution and to his country, and if he combine with his research ability, a clear and simple understanding of the art of teaching, his value is beyond all estimation.

A large proportion of those who "research" in our colleges and universities fall into the fourth class. Sometimes they are men of high value as teachers. There have been, both in this country and in Europe, teachers of science who contributed nothing to the actual advance of science themselves, but they were able to train great students. As a rule, one who has that clear and discriminating quality of mind which enables him to present as a teacher the complicated processes of science is likely to find himself able to contribute to the progress of science itself. One who has ever heard Professor Pupin or Professor Millikan explain an intricate scientific process to a popular audience can scarcely doubt that the intellectual quality which enables such a man to make clear the fundamentals of difficult problems to a layman is close akin to that same discriminating quality which has enabled them to make discoveries. Perhaps the difference between the great teacher and the great investigator lies not so much in the ability to discriminate, as in the possession of an imagination which turns the discriminating quality in the one direction or the other.

Among these groups of men in our colleges and universities some four or five different things are going on under the name of research. A few men of extraordinary ability and originality are seeking to solve great fundamental problems. Another group, while dealing in a more or less intimate way with these problems, is engaged in verifying results not fully proved, in applying these results in new fields, and in making available to society the discoveries and advances of science. The great army of workers in research is occupied with problems involving generally no great degree of originality, but requiring, nevertheless, a high order of knowledge and of ability. Such problems will pertain as a rule to a limited field, to a special process, or to the effort to confirm and establish something already suggested or implied in the work of other men.[1]

CONCLUSIONS.

The matters discussed in the preceding pages point to some general conclusions.

The profession of medicine is rooted in medical education and will not rise higher than the soil in which it grows.

The agencies that have to do with education for the medical profession consist not only of the undergraduate medical school, but include also the postgraduate medical school, the hospital, with the special units that may gather about it, the research laboratories, and the associations of professional men who in large measure determine the ideals and the spirit of the profession. Any agency dealing with medical education as a whole must take into account all these influences, and only by the common development of all of them can the profession attain its highest usefulness and contribute its best service to society. Intimately connected with the development of these agencies of education—the medical schools, the hospital, the research laboratory, the clinic—is the farreaching problem of the organization of the medical profession in order to meet the growing complexity of the practice and the large demands of the social order. These are not separate and distinct things. They are parts of one thing: namely, the preparation of men for the highest and at the same time the most practical ideal of the medical profession—an ideal that represents equally the spirit of scientific inquiry and that of human service. And these various forms of endeavor—the school, the hospital, the laboratory, and the profession itself—must somehow learn to work in cooperation for this common good.

The separate reforms referred to in the preceding paper cannot all come at once. But the steps leading to them ought to be taken at the same time and with reference to each other. The reform of the curriculum, the development of the graduate school, the integration of the hospital with teaching and with research, the organization of the profession, must all be conducted by medical men themselves under such leadership as may spring from their own ranks. It cannot be expected that all these efforts will advance *pari passu*. But it will none the less serve a larger purpose if those who lead the profession of medicine shall have a clear view of the direction of future development and are able to view it from a perspective which takes account of all those agencies and organizations upon whose common development the future of the profession depends.

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[1] The topics of the cost of medical education and of medical service and the organization of the medical profession will be presented in the author's reprint.

The Recognition of Impaired Renal Function

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Until about twelve years ago the diagnosis and prognosis of nephritis depended almost entirely upon uranalysis and physical examination. The possibility of supplementing these time honored procedures by more refined methods designed to detect impairment of renal function under various pathological conditions, first became apparent when, in 1909 Rowntree and Geraghty advocated their widely employed phenolsulphonephthalein test and when the following year Schlayer, Takayan and their coworkers began the publication of their extensive observations on experimental nephritis. Ever since, numerous workers in the medical clinics of this country and Europe have been applying themselves to the many aspects presented by this complex problem of nephritis. In this country the most notable work along these lines has come from Christian and his associates in the Peter Bent Brigham Hospital in Boston; from the late Theodore Janeway and Mosenthal working in the Johns Hopkins Clinic; from Stengel and his coworkers at the University of Pennsylvania, and from Epstein and others at the Mt. Sinai Hospital in New York.

However interesting such a review might prove, it is beyond the scope of this paper to discuss at all systematically the many important advances in our knowledge of nephritis that have resulted from this recent widespread interest in the subject. Suffice it to point out that chief interest has centred about the problem of devising satisfactory clinical tests for kidney function with the object of recognizing the early stages of renal insufficiency on the one hand and throwing light on the prognosis and management of renal disease on the other. At the same time efforts have been made to correlate functional tests and clinical findings during life with the types of nephritis found postmortem in the hope of formulating a more satisfactory clinical grouping of the nephritides than has heretofore been possible.

It must be admitted that many of the results sought for have not been attained as yet. Contrary to the belief of some enthusiasts, the newer functional tests have by no means replaced the older clinical methods. The pathological physiology of the kidney is still in large measure obscure, and innumerable problems of fundamental importance await solution. Nevertheless, the introduction of functional methods into the study of nephritis has been a definite advance and has elucidated many features of renal disease that until lately were but little understood. Like all laboratory methods, these tests must at present be looked upon as adjuncts to the ordinary methods of diagnosis, but as such they are often capable of furnishing valuable diagnostic information and of aiding in prognosis as well as in checking up the effects of treatment.

All of the methods that have been advocated for the functional testing of the kidneys will not be discussed, since many of these methods are cumbersome and ill suited to routine clinical application, whereas others, which aroused high hopes when introduced, have been shown to be only confirmatory of information that can be more easily and quickly gained by other means. Only those tests will be dealt with that personal experience has proved to be of practical value and which may be readily employed in private practice and in the ordinary well equipped hospital.

URINARY VOLUME AND FIXATION OF SPECIFIC GRAVITY.

One of the most easily carried out and at the same time most useful tests of renal function is a study of the variations in the volume of urine and the specific gravity. In general the importance of this test is not appreciated, which is the more remarkable since it is readily available to every practitioner and requires no elaborate laboratory equipment. In a normal individual no matter whether the diet is high or low in protein, provided a certain amount of water is ingested at regular intervals, the kidneys will excrete a volume of urine proportionate to the fluid intake, and specimens of this urine collected throughout the twenty-four hours will show certain variations in specific gravity. This fact is dependent upon the function of the kidneys normally to eliminate water and at the same time to concentrate, i. e., to eliminate in the urine certain solids in the form of inorganic salts and waste organic substances. The specific gravity of the urine is an index of the degree of urinary concentration and indicates whether or not an adequate amount of solids is being excreted by the kidneys. Under pathological conditions, variations occur in the volume of urine and the degree of urinary concentration. These variations have definite significance and are readily determined as follows:

At one time it was thought necessary to place patients on fixed diets in order properly to carry out this test, but as Mosenthal (1) has recently pointed out, such procedure is not only unnecessary but a decided disadvantage, since our object is to discover the efficiency of renal function in a given individual under ordinary conditions of life. Therefore, it is better to conduct these observations on an ambulant patient who is following a usual routine and taking an accustomed diet.

The patient is instructed to void urine on rising and to discard this specimen. After breakfast, say at 10 a. m., urine is voided and placed in a separate bottle. Thereafter during the day urine is voided and collected in separate bottles every two hours until and including 10 p. m.; all the urine voided during the night, that is after 10 p. m., is then added in one receptacle to that voided at 8 a. m. the following day. These two hourly day specimens and the night urine are then sent to the laboratory along with a record of the amounts and kinds of food and fluid taken during the period for which the urine was collected. The volume of urine is then measured, the night urine being measured separately and the specific gravity of each specimen is taken and recorded. Such a routine is recommended by Mosenthal (2).

In a person with normal kidneys the total volume should bear a close relationship to the amount of fluid ingested, the volume of the night urine should not exceed 750 c. c. and usually should not be over 400 c. c. The specific gravity of the various specific gravity of the various specimens should not be fixed at either a high or a low level but should be variable and in at least one specimen should be 1,020 or over. When the specific gravity is fixed at a high level, i. e., if all the specimens show a specific gravity of 1,020 or over, it means chronic passive congestion of the kidneys from myocardial failure or acute or chronic tubular or diffuse noninndurative nephritis, which as a rule is accompanied by edema. Under these conditions the kidney loses its ability to vary the concentration. The pathological conditions marked by this high fixation of the specific gravity are also associated with a diminution of urinary volume—oliguria, as well as other manifestations that render their recognition easy.

A low fixation of the specific gravity is of different significance. Under such circumstances the two hourly specimens and the night urine will consistently show a low specific gravity, which will vary only a few degrees and which in no specimen will reach 1,020. This means that the kidneys have lost their ability to concentrate and that they are unable properly to eliminate certain solids. Low fixation occurs in a number of conditions, notably in chronic glomerular nephritis, and also when there is marked anemia, diabetes insipidus, and during the elimination of edema. It is, as a rule, associated with a polyuria and in chronic glomerular nephritis with a definite nocturnal polyuria. Indeed, the polyuria is a compensatory effort on the part of Nature to maintain the elimination of solids through kidneys that have lost their power of urinary concentration. When the polyuria ceases, symptoms of toxemia are likely to supervene.

Fixation of the specific gravity at too high or too low a level is strongly suggestive of impaired renal function and calls for further investigation. When considered in conjunction with uranalysis we have a most effective index of kidney insufficiency.

In patients who are on their accustomed diet, valuable data in reference to the suitability of their dietary can be obtained while this two hourly test for urinary concentration and volume is being carried out if the sodium chloride and nitrogen excretion in the urine is estimated. Mosenthal (3) has especially emphasized this fact and insists that these determinations are valueless unless the patients are taking their ordinary quality and quantity of food. He has shown that if more than five grams of sodium chloride are present in the twenty-four hour urine too much salt is being ingested and patients should be instructed to take less. The effects of excessive salt intake is to overtax the kidneys, to raise blood pressure, and induce nocturnal polyuria. According to the same investigator five or six grams of nitrogen in the urine means a protein intake of thirty-five to twenty grams of protein a day and is the lowest daily excretion compatible with a diet sufficient to maintain strength. Figures below five or six grams mean that the protein intake is inadequate. If not more than this amount appears in the urine, other things being equal, there is no need to further cut down the ingestion of proteins. The estimation of the urinary nitrogen alone does not furnish information in regard to nitrogenous retention; this can only be ascertained by estimating the blood uric acid, urea and creatinin, a phase of the subject which will be discussed later.

PHENOLSULPHONEPHTHALEIN TEST.

Since its introduction in 1909 by Abel and Rowntree (4) and later studied by Rowntree and Geraghty (5), the phthalein test has become the best known and most widely employed of all the renal functional tests. The value of the test has been amply demonstrated by a host of observers in all countries. Other tests based upon the elimination of different dyes such as prussian blue, methylene blue and indigo-carmine, have had their advocates, but experience has shown them to be less generally useful, especially in medical conditions, than the phthalein test. Although the technic of carrying on the phthalein test is so well known as scarcely to need detailed mention, the test is performed frequently so carelessly that it may not be out of place to emphasize the importance of adhering to an accurate technic, otherwise the results are not trustworthy.

When the phthalein test is performed repeatedly with a view to determining variations in the renal function, it is of the utmost importance, if reliable results are to be obtained, that the test be performed each time under identical conditions. For example, the same amount of dye must be used, the same amount of fluid must be administered at the same time before the test, and the injection must be made the same way and into the same part of the body each time. Many of the conflicting results reported are the outcome of faulty technic.

It is definitely proved that the amount of dye excreted bears a certain relation to the renal function at the particular time the test is made. The test is perhaps the best index we possess for determining total renal function. It does not, however, throw light on which part of the kidney is especially involved, whether the fault lies chiefly with the tubules or glomerulæ. Therefore, the phthalein test cannot be regarded as particularly useful in determining the type of nephritis present.

In normal individuals the total phthalein output at the end of two hours should amount of fifty to seventy per cent. after intramuscular injection and sixty to eighty per cent. after intravenous. A total phthalein elimination of thirty per cent. for two hours suggests strongly impaired renal function. With markedly deficient kidneys the phthalein may fall as low as ten per cent. and even to zero. Although such marked diminution of phthalein may be regarded as conclusive evidence of severe loss of kidney function, the converse is not true, for it has been repeatedly shown that a normal phthalein does not exclude renal disease.

From data collected from various studies the effect of different types of renal lesions upon phthalein elimination may be summarized as follows:

In cardiac decompensation producing passive congestion of the kidneys, the phthalein output is as a rule reduced. In extreme degrees of congestion it may fall to almost zero. But as the circulatory condition improves the phthalein promptly returns to a normal level. The elimination of phthalein is variable in the tubular type of nephritis. In early and mild cases even with considerable albuminuria and casts, the phthalein has often been found normal or even increased. In the advanced chronic cases the reduction is usually marked, frequently down to fifteen per cent. In acute glomerular nephritis the phthalein test may vary from normal to zero. It seems to have little prognostic value in this type of acute nephritis, as even in cases with phthalein elimination down to zero the patients have recovered.

The test is of more significance in chronic glomerular nephritis and the renal sclerosis. In the early or subacute stage of chronic glomerular nephritis the phthalein along with other functional tests may be but little influenced. However, in the later stages of this condition, the phthalein output is definitely reduced and may finally fall to a mere trace or to zero. In this type of nephritis it furnishes a variable guide to prognosis and by its steady fall as the case advances, frequently heralds the approach of uremia. In the arteriosclerotic kidney or senile type of renal sclerosis the phthalein is reduced and in the late stages of this condition may reach a level almost as low as that observed in chronic glomerular nephritis. On the other hand, in the renal changes associated with socalled benign sclerosis or primary hypertension, it is noteworthy that the elimination of phthalein is as a rule normal and has even been found above normal. This fact has been used by Stengel (6) to differentiate cases of benign hypertension from the graver instances of high blood pressure associated with primary renal changes.

It seems established that the phthalein test is of little value in the early diagnosis of nephritis, since deficient phthalein output does not occur until evidences of renal disease are recognizable by ordinary means, such as physical examinations, blood pressure determinations, and uranalysis. On the contrary, these clinical manifestations of nephritis may be obvious while the phthalein test is still quite normal. In the acute forms of nephritis it is of doubtful significance both diagnostically and prognostically. The chief value of the test is found in the chronic nephritides. In these renal conditions, provided edema is not marked, it is of definite prognostic import and it also furnishes a valuable guide to the effects of treatment.

The phthalein test, the estimation of urinary volume and fixation of the urinary specific gravity may be regarded as the simplest renal functional tests which are so readily carried out that they lie within the reach of every practitioner. These, taken in conjunction with careful physical examinations, intelligent interpretation of urinary analyses and blood pressure determinations, are sufficient to furnish adequate information both for the diagnosis and prognosis of the majority of renal disorders ordinarily encountered. The renal functional tests now to be considered are somewhat more difficult to carry out and require more special laboratory training. Nevertheless, the information which they furnish is of sufficient value and importance to make their use obligatory in every well organized medical clinic.

CHLORIDES IN THE URINE.

One of the most useful early evidences of impaired renal function has been found by Frothingham (7) and others, to be delayed elimination of chlorides in the urine. In individuals with normal kidneys ten grams of sodium chloride added to a standard daily intake is completely eliminated in twenty-four hours. With diseased kidneys this normal chloride elimination is quickly impaired. With normal kidneys the concentration of chlorides in the urine is about one and eight tenths per cent., whereas diseased kidneys are often unable to concentrate the chlorides in the urine above five tenths to three tenths per cent. Chloride retention occurs in passive congestion of the kidneys and in all the forms of nephritis that are not associated with polyuria. However, before chloride retention can be attributed to renal disease the numerous extrarenal causes of such retention must be excluded. Conspicuous among these extrarenal causes are cardiac edema and the formation of exudates, as occurs in lobar pneumonia. Urinary chlorides may be estimated by McLean's modification of Volhard's method.

The relationship between chloride retention and edema has been much discussed of late. Frequently the two conditions are associated and there are some, who, adhering to the theory of Widal, regard chloride retention as the cause of nephritic edema. Although this may be true in some instances, it is certainly not invariably the case. Chloride retention and edema may and do occur alone as often as they are found in association. When edema and chloride retention are associated, water retention can be demonstrated; on the other hand, when chloride retention occurs without edema, water retention is absent. As a rule, retention of chlorides is to be found in those types of nephritis characterized by oliguria, urine of high specific gravity, and edema, while chloride retention is rarely observed in the group of nephritides in which polyuria, low fixation of specific gravity and an absence of edema occur.

In connection with any discussion of sodium chloride retention and edema, mention should be made of the work of Epstein (8) on certain cases of socalled chronic parenchymatous nephritis with oliguria and edema. He believes that the edema in these cases is not due to salt retention resulting from defective renal function in eliminating chlorides, but that the cause of the edema is extrarenal and is dependent upon certain alterations in blood chemistry. He has shown that in many of these marked cases of chronic parenchymatous nephritis, the total protein content of the blood serum decreases and at the same time there is a rise in the globulin fraction and the lipoids are increased. This decrease in the protein content of the blood results from the constant loss of large quantities of albumin in the urine. The outcome of this protein deficiency of the blood serum is a decrease in the osmotic pressure of the blood and this in turn allows the fluids of the blood to be absorbed and retained by the tissues. Epstein has made use of these observations therapeutically and has reported series of cases in which salt free diets failed to reduce marked edema which yielded promptly and permanently to diets rich in protein and low in fats. Epstein's theory does not seem to have been generally confirmed and the usual belief is that the edema of nephritis is more or less directly connected with the inability of certain kidneys adequately to eliminate sodium chloride.

Provided we are careful to eliminate the extrarenal causes of chloride retention, we have in delayed or defective salt elimination a useful early index of renal impairment, more especially in the tubular varieties of nephritis.

NITROGEN ELIMINATION.

Among the important functions of the kidneys is that of eliminating nitrogen. Under certain pathological conditions, notably acute and chronic glomerular nephritis and in senile sclerosis of the kidney, this function becomes impaired and delayed and deficient nitrogen elimination is observed. On the contrary, nitrogen output is not seriously impaired in chronic passive congestion, benign sclerosis, or in tubular nephritis. Nitrogen elimination is tested by determining the rapidity with which a given quantity of urea (fifteen grams which equal seven grams of nitrogen) when added to a standard diet is eliminated. Normally the entire amount should be eliminated in twenty-four hours. In order to perform this test the total nitrogen in twenty-four hour specimens of urine must be estimated. Formerly this was done by the Kjeldahl method, but more recently Folin's method or the simpler estimation of the urea by the urease method, has been used. The nitrogen output may be influenced by extrarenal factors, such as excessive tissue catabolism from toxic causes.

Since salt retention is found more especially in the tubular or parenchymatous types of nephritis, whereas delayed nitrogen excretion is more common in the glomerular forms of renal disease, these tests may be helpful or confirmatory in the diagnosis of the various types of renal disease. The knowledge obtained from such retention tests is especially useful from the therapeutic viewpoint since they furnish a basis for dietetic management.

The functional tests thus far discussed have dealt entirely with either the increased or diminished capacity of the kidney to eliminate certain substances. There is, however, another group of functional tests which have obtained an increasing importance and which depend upon alterations in the normal blood chemistry in consequence of the inability of the kidney to eliminate certain metabolic waste products in sufficient amounts. Tests of this character have been made possible only through the great advances made of late in our knowledge of blood chemistry and the introduction of comparatively simple methods of blood analysis. These newer methods require only small quantities of blood and are sufficiently easy to make them available even to those who lay no claim to detailed chemical knowledge.

NONPROTEIN AND UREA NITROGEN OF THE BLOOD.

The most valuable information both diagnostically and prognostically is obtained by estimating the noncoagulable or nonprotein nitrogen of the blood and the urea nitrogen. When a kidney loses its power to excrete nitrogen promptly and sufficiently these metabolites, end products of nitrogenous metabolism, are retained. Such retention is evidenced by an increase in the amount of these substances in the blood. The estimation of the nonprotein nitrogen is of more importance than the determination of urinary nitrogen.

In normal individuals the nonprotein nitrogen of the blood varies between twenty-five and forty mgm. to one hundred c. c. of blood. The various constituents of the nonprotein nitrogen give the following values (8) under normal conditions (9).

Urea nitrogen	10 to 18 mgm. to 100 c. c.
Creatinin	.01 to 08 mgm. to 100 c. c.
Uric acid	.05 to 3.0 mgm. to 100 c. c.

Urea nitrogen is chiefly responsible for increases in the total nonprotein blood nitrogen. Therefore, today it is rarely necessary to estimate anything except the urea nitrogen when evidences of nitrogen retention are sought for in the blood. The total nonprotein nitrogen is approximately twice the urea nitrogen. The Folin method (10) for nonprotein nitrogen or recent modification of it by Taylor and Hulton (11) are the methods usually employed. The modifications of Marshall's urease method for urea nitrogen by Van Slyke and Cullen (12) is the most satisfactory method of determining the urea nitrogen. Unles a patient is on a known standard diet it is always well to collect blood for these examinations in the morning after a period of starvation before breakfast.

The nonprotein nitrogen and urea nitrogen are modified somewhat by diet in both normal and nephritic individuals. After a full meal Tileston and Comfort (13) found in normal subjects the nonprotein blood nitrogen rose between four and five mgms. In nephritics both Frothingham and Smillie (14) and Hopkins and Jonas (15) found that increasing the protein in the diet increased the nonprotein nitrogen and that the reverse was also true. The rise in nonprotein nitrogen due to dietetic alterations varied from three to twenty-six mgms. to one hundred c. c., depending upon the amount of nitrogen added to the diet. This increase in the blood nitrogen due to diet is, however, much less marked and much less significant than the rise that results from impaired renal function. It has been shown with considerable certainty that, other factors being equal, the nonprotein blood nitrogen and urea nitrogen increase in proportion to the degree of renal insufficiency present.

This alteration in the blood takes place in most nephritic conditions. It has been observed in acute and chronic glomerular nephritis, in some types of severe tubular nephritis, and in senile sclerosis. The urea nitrogen may be temporarily increased in chronic passive congestion of the kidneys, but returns to normal as the circulation improves. There is rarely any increase in the urea nitrogen in mild forms of tubular nephritis or in benign sclerosis.

Gettler and St. George (16) give the following values for blood urea nitrogen and nonprotein nitrogen based upon the blood analyses in six hundred nephritic patients.

Total nonprotein nitrogen..40-460 mgm. to 100 c. c.
Urea nitrogen..............23-375 mgm. to 100 c. c.

This gives some conception of the wide variation in values encountered. The most consistently large amounts of urea nitrogen are found in those cases that have a tendency to uremia. In most cases of uremia there is a blood urea nitrogen up to fifty to one hundred and fifty mgm. to one hundred c. c. On the other hand, although high blood urea nitrogen in chronic nephritics is always suggestive of uremia, the possibility of impending uremia cannot be excluded in cases where the urea nitrogen is but little increased. In chronic nephritis a persistently high blood urea nitrogen (forty to eighty mgm.) is of prognostic import, but it must be remembered that such blood findings are not early evidences of nephritis and only develop as a rule after other well known manifestations of chronic nephritis are obvious. The blood urea nitrogen is of less prognostic significance in acute nephritis or in acute exacerbations of chronic nephritis, for in both these conditions it may rise rapidly especially if oliguria or anuria exist, only to return rapidly to a normal level as the acute condition clears up. When taken in conjunction with clinical examinations, uranalysis, blood pressure findings, the phthalein test, and the fixation of the specific gravity, we have in the estimation of blood urea nitrogen a functional test of decided clinical and diagnostic value. It is safe to assert that persistent urea retention always means renal insufficiency, provided all extrarenal causes for such retention are excluded. These extrarenal causes include diet, various metabolic conditions, the subsidence of edema with diuresis, and agonal conditions.

Recently considerable attention has been directed to the significance of other nonprotein nitrogen constituents of the blood in renal conditions especially the uric acid nitrogen and creatinin. Uric acid concentration in the blood is regarded by some observers as the earliest and most delicate evidence of impairment of kidney function. When the blood urea is increased there is almost always an increase in the uric acid of the blood, but the increase in uric acid seems to antedate the rise in urea nitrogen. Baumann, Hausmann, Davis and Stevens (17) in one hundred and eighty renal functional studies, found the blood urea nitrogen was increased.

Blood uric acid of three mgm. to one hundred c. c. of blood or over, must be regarded as an abnormally high concentration. It must be remembered, however, that uric acid may be increased in the blood under various conditions, as for example gout. Therefore, although doubtless one of the earliest, if not the earliest, indication of slight renal impairment, increased uric acid in the blood *per se* cannot be taken as conclusively diagnostic of nephritis unless other evidences of nephritis are present.

The increase in creatinin content of the blood is also a valuable functional test, but a late one. Whereas urea nitrogen may be derived in part from the diet and its increase in the blood may be modified by restriction of protein intake, the creatinin is little influenced by diet, and is wholly endogenous in origin when an individual is on a meat free diet. The increased creatinin concentration in the blood is not so delicate a test of renal function as either the uric acid or urea retention, but it is of more prognostic value. Myers and Killian (18) have definitely emphasized the fact that an increase of creatinin of two mgm. to one hundred c. c. of blood or over is of serious prognostic import. The outlook for duration of life is decidedly limited if there is creatinin concentration. These authors found that in seventy-five cases with five mgm. or more of blood creatinin, all the patients but one died within a year and sixty within two months of the time the test was made.

To recapitulate briefly, the earliest evidence of renal insufficiency as shown by an increase in the nonprotein nitrogen elements of the blood, is an increased concentration of blood uric acid. The most generally valuable clinical and diagnostic measure of kidney function is the retention of blood urea nitrogen and the functional test of gravest prognostic import is an accumulation of creatinin in the blood.

CHLORIDES IN THE BLOOD.

Of less general application is the determination of the chlorides in the blood. In certain types of renal disease, more especially those associated with water retention and edema, the estimation of blood chlorides furnishes a valuable functional test. The chlorides of the blood are best estimated by the method of McLean and Van Slyke (19). Under ordinary dietetic conditions in normal individuals the sodium chloride concentration of the blood varies from 5.6 to 6.1 gm. to the litre. When excessive quantities of chlorides are ingested these figures are higher. Normally the kidneys by prompt elimination of any excess of chlorides maintain a normal ratio between intake and output, so that a chloride balance is established and the blood chlorides remain fairly constant. When by reason of a nephritis, especially one of tubular type, the kidney loses its ability to eliminate sodium chloride, this salt is held back and becomes stored up in the blood and tissues. Under such circumstances the sodium chloride concentration of the blood plasma may rise to 7.1 gm. to the litre.

The various tests above referred to comprise the methods of testing the functional capacity of the kidneys that in the experience of the majority of clinicians have proved of most use and practical value. As was said earlier, they by no means include all the functional tests advocated but those that have been omitted have been discarded either because they have not been tested out sufficiently to demonstrate their value or because they have already been proved too inaccurate or cumbersome for routine clinical use. Before dismissing this subject mention should be made of certain complicated formulæ for which high hopes were entertained when first introduced, but which experience has shown furnish no more valuable data than can be obtained from the intelligent interpretation of the above enumerated functional tests.

Ambard believed that the rate of urea excretion would furnish a more delicate index of impaired renal function than the mere estimation of the urea in the urine or the blood urea nitrogen. He forthwith devised a complicated mathematical formula which expressed relationship between the concentration of urea in the blood, the grams of urea excreted in the urine, the rate of water excretion and the body weight. The result of this calculation is referred to as Ambard's coefficient. McLean then modified this formula and constructed a slide rule by which the formula could be more readily worked out. Ambard also applied his principle to the chlorides and this law was also modified by McLean.

The work of Ambard and McLean is a wonderful example of ingenious research, but the practical results of their formulæ have fallen far short of earlier expectations. Even for normal individuals their results vary widely under numerous conditions, and the information obtained from their calculations on nephritics is no more enlightening than that which is obvious from ordinary clinical examinations and the less complicated functional tests. The Ambard coefficient and McLean index may, therefore, be disregarded, and indeed these calculations have been abandoned in most medical clinics.

Recently Austin Stillman and Van Slyke (20) have advanced a new formula for measuring the rate of urea excretion. Their formula is a modification of McLean's index. How practical and successful this new and simplified formula will prove remains to be demonstrated. It is undeniable that some index capable of measuring slight degrees of renal insufficiency is urgently needed since the functional tests now available are of little value for the early detection of renal lesions.

REFERENCES.

1. Mosenthal: *Medical Clinics of North America*, July, 1920, p. 209.
2. *Idem: Ibid*, p. 24.
3. *Loc. cit.*
4. Abel and Rowntree: *Journal of Pharmacology and Experimental Therapeutics*, 1909, i. p. 231.
5. Rowntree and Geraghty: *Archives of Internal Medicine*, 1912, vol. ix, 3, p. 284.
6. Stengel: *Medical Clinics of North America*, September, 1917.
7. Frothingham: *American Journal of the Medical Sciences*, 1915, cxlix, p. 808.
8. Epstein: *Medical Clinics of North America*, July, 1920, p. 187.
9. Wells: *Chemical Pathology*, fourth edition, 1920, p. 536.
10. Folin: *Journal of Biological Chemistry*, 1912, xi, p. 527.
11. Taylor and Hulton: *Ibid*, xxii, p. 62.
12. Van Slyke and Cullen: *Journal of Biological Chemistry*, 1915, xix, p. 211.
13. Tileston and Comfort: *Archives of Internal Medicine*, 1914, xiv, p. 620.
14. Frothingham and Smillie: *Ibid*, 1915, xv, p. 204.
15. Hopkins and Jonas: *Ibid*, p. 964.
16. Gettler and St. George: *Journal A. M. A.*, 1918, vol lxxi, p. 2033.
17. Baumann, Hausmann, Davis, and Stevens: *Archives of Internal Medicine*, 1919, xxiv, p. 70.
18. Myers and Killian: *American Journal of the Medical Sciences*, 1919, clvii, p. 674.
19. McLean and Van Slyke: *Journal of Biological Chemistry*, 1915, xxi, p. 361.
20. Austin, Stillman, and Van Slyke: *Journal A. M. A.*, June 5 and 26, 1921, vol. lxxiv.

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Medicine's Duty Toward the Tuberculous Patient*

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That medicine has a duty toward the tuberculous patient is saying what may seem selfevident, for medicine has a duty toward all who suffer from disease. At this time, however, medicine owes a special duty to the tuberculous patient, as a partial compensation for the neglect accorded him during preceding ages and as a partial compensation for the campaign for better health which has been inaugurated and prosecuted as antituberculosis propaganda. In the past quarter of a century tuberculosis has really, for the first time, come to the place where its nature is sufficiently comprehended to make it a disease to be generally understood. While there are still many problems connected with this disease which demand the attention of the best medical minds for their solution, yet we now understand it sufficiently to approach it with a marked degree of intelligence.

STATISTICAL.

There are about 140,000 physicians practising their profession in the United States. There are about 140,000 deaths from tuberculosis each year. This means that each physician will have on an average about one death from tuberculosis each year. The number of cases of active tuberculosis in a given community in a given time is at least four times the number of deaths from the disease. Therefore, if each practitioner saw his due proportion of cases he would see about four cases a year and have at least one death from the disease each year. During a practice of twenty-five years he would come in contact with more than one hundred cases and sign death certificates for at least twenty-five.

How many other serious diseases are met with equal frequency? How about pneumonia, heart diseases and nephritis? There are about 140,000 deaths from pneumonia in an average year, not counting influenzal years; 125,000 deaths from heart disease, and 100,000 deaths from nephritis. This means a yearly mortality for each physician of one for pneumonia, less than one for heart affections, and about two thirds of one for inflammation of the kidney. Pneumonia is of short duration and its mortality is from ten to twenty-five per cent., so each physician on an average should see from five to ten cases a year. Heart and kidney affections are chronic and last over many years, so if each physician saw his quota it would be many times the number indicated in the mortality table.

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Upon the face of these figures there is no way of excusing the relative lack of interest in tuberculosis; nor can it be excused on the basis of the other diseases being more amenable to treatment. We do not know how much the treatment initiated adds to the recoveries from pneumonia, nor is there any way of telling how many years are added to the lives of those who suffer from heart and kidney affections through treatment. We do know, however, that there is a vast difference in the mortality statistics of treated and untreated cases of tuberculosis. We know, further, that there is a time in nearly every case of clinical tuberculosis when, if an adequate treatment is instituted and carried out under proper conditions, the patient will have seventy-five or more per cent. chances of an arrestment of the disease; and we know further that by living a careful hygienic life the individual may carry on his work and make the arrestment permanent in most instances. It is only with early diagnosis and immediate intelligent treatment that such favorable results may be obtained.

Any disease which carries with it so much hope of permanent relief demands earnest consideration of the medical profession. Regardless of the work done by the specialist, the burden of conquering tuberculosis is upon the general medical man. Therefore, he should be able to diagnose early tuberculosis, or at least to suspect it; he should know the principles of therapy and be able to carry out the more simple ones, and he should be able to instruct the patient and those who live with him in carrying out a hygienic régime to prevent infecting others.

Medical men as a rule are pessimistic as to the results of treatment. They are also pessimistic as to their own ability to diagnose and treat the disease. It should further be added that their pessimism regarding their ability to diagnose the disease will not add optimism to their opinion of the results of treatment; for the results of treatment vary in proportion to the earliness of diagnosis and treatment. It is very desirable that general practitioners should learn to diagnose tuberculosis early; in fact, it is desirable that all medical men should be able to do so. One of the greatest advances possible in the prevention and cure of tuberculosis would be to have the profession in general assume an interest toward it, such as that which it now assumes toward other diseases.

Experience indicates that there is an inability on the part of some members of the profession, and an unwillingness on the part of others, to recognize this disease until it is far advanced and often hopeless, but the chief reason for the general failure to recognize the early symptoms and signs is not so much a lack of ability, but because physicians do not take sufficient time to examine and study the case, and, further, because they are looking for signs which are too gross. It is only advanced tuberculosis which is accompanied by gross signs.

I wish to reiterate and emphasize what I said many years ago when discussing this point. If the physician, because of lack of training, lack of experience, or lack of interest cannot diagnose early clinical tuberculosis himself, he should at least be able to recognize those symptoms and signs by which it is suspected; and, suspecting it, he can secure the aid of others by whom the diagnosis can be made. Nearly every large community now has one or more men who are giving special study to tuberculosis.

In order to know when to suspect tuberculosis, the physician must understand the nature of the disease. He must recognize its chronic nature and understand that months, years, and at times even several decades may intervene between the time of infection and the clinical manifestations of the disease. The disease at first affects the lymphatic glands, those about the lung most commonly; then it gradually extends to the pulmonary tissues either through the blood stream or through the lymph channels. This pulmonary infection takes place at various age periods, but occurs in a very large percentage, considerably more than one half, of people who attain adult life.

In spreading to the lung it spares no type of individual. The old, the young; the poor, the rich; the fat, the thin; the nervous, the phlegmatic; the undersized, the giant, may all have either infection in the lung or clinical tuberculosis. Infection, however, does not mean clinical disease. The majority of tuberculous infections of the lung lie dormant or heal without the host being aware of their presence. On the other hand, a quiescent focus may become active at any time and produce the clinical disease. So one should not be surprised at finding evidence of active tuberculosis in any person. It is a disease that one should always bear in mind; in fact, we should think of it in the same manner that we are taught to consider syphilis.

CAUSES OF EARLY SYMPTOMS.

There are three causes operating to produce symptoms in early tuberculosis: 1, the toxins, which act through the nervous system and endocrine glands, particularly influencing structures peripherally through the sympathetic nerves; 2, the inflammation in the lung which produces reflex symptoms in other organs and tissues; and 3, the disease process itself effecting local changes in the tissues involved, such as expectoration, pleurisy, and blood spitting. Tuberculosis should be suspected when a patient gives a history of being run down, accompanied by some of the following symptoms: Loss of weight, hoarseness, cough, blood spitting, pleurisy, or frequent colds. A rise of temperature may or may not be present. Many elevations of temperature of a few tenths of a degree are wrongly attributed to tuberculosis simply because no other cause is evident; and, again, many cases of active clinical tuberculosis are overlooked because a rise of temperature is expected and not found. A rise of temperature is not necessarily present at all times during the time when tuberculosis is clinically active. Entirely too much stress has been laid on this in the past. It has not been uncommon for a diagnosis of tuberculosis to be made on a continuous daily rise of temperature of one or two fifths of a degree above normal, even though other symptoms were not present, just as though tuberculosis was the only disease which could produce such a rise of temperature.

In many instances periods of reduced physical and nervous equilibrium caused by early tuberculosis are of such short duration that their true significance is not suspected. Early clinical tuberculosis is at times overshadowed by what is taken for a cold, but which persists longer than a simple cold and, because of this fact, should arouse suspicion. If the strength returns with the subsidence of the cold, as it often does, tuberculosis may not and probably will not be suspected.

It is with these early clinical manifestations that the profession should familiarize itself. Later, when cough, profuse expectoration, fever, and emaciation appear, a layman should be able to make the diagnosis. In fact, it is a common experience among tuberculosis workers to have early diagnoses made by laymen, particularly those who have had the disease themselves, or those who have been intimately associated with it. The reason for this is that, having had it or having known it intimately, they have become familiar with the symptoms. It is upon symptoms that we must rely for suspecting its presence. A carefully taken clinical history with intelligent analysis of the symptoms elicited will furnish data upon which a suspicion of tuberculosis may be based in nearly all instances of active disease. It is the most important and most trustworthy of all diagnostic procedures for those who are not intimately working with the disease.

Physicians who are not making frequent examinations of chests must not depend too much upon the stethoscope. There is much room for error in physical examination for early clinical tuberculosis. It is at times difficult to determine whether activity is present or not; and unless one is experienced and has frequent practice in chest examinations he should rely on data obtained in other ways.

The x ray is now being used quite generally in the diagnosis of tuberculosis, but it should be understood that many genuinely early cases cannot be detected in this way. Nevertheless, when available the x ray should be used in those cases which can be diagnosed in this way. In its failure to detect the earliest cases it is in the same position as physical examination as generally employed. Even if the earliest cases can not be diagnosed by medical men in general it is their duty to make the diagnosis as early as possible, because the percentage of favorable results rapidly declines with the advancing disease. Every means at command should be utilized for the aid that it will give, and the diagnosis should express the combined results of all methods used.

When a diagnosis has been made, a sufficient and intelligent treatment should be instituted at once. The profession must hasten to accept the importance of proper treatment for this disease. Unfortunately the curability of tuberculosis is judged too much from the statistics of institutions which for want of funds are handicapped in supplying the best and most efficient régime; and from patients who, either because of a failure to understand the nature of the disease or because of an inability or unwillingness to cooperate sufficiently long, fail to secure the best result obtainable.

Under ideal conditions early tuberculosis yields to treatment in nearly all cases; and moderately advanced cases can be brought to a state of quiescence in far more than a majority; and even far advanced cases may lose all signs of activity and become quiescent in quite a respectable percentage. The percentage of favorable results depends upon many factors, such as the degree of activity, the extent of the lesion, the general physical and nervous equilibrium of the patient, and his ability and willingness to cooperate. For best results early diagnoses and immediate treatment are demanded; but, whenever the diagnosis is made, an intelligent treatment should be adopted with the loss of as little time as possible

All patients can not go to sanatoria and there would not be beds available if they could; so the general practitioner, whether he wills it or not, is forced to treat many tuberculous patients. He should, therefore, master the principles of treatment which are generally recognized as of value. He should at least know the principles which underlie open air, food, rest, exercise, and psychotherapy.

TREATMENT.

While there have been innumerable remedies and measures suggested for the treatment of tuberculosis the generally approved treatment so far consists of a few simple measures. These are based on physiological principles which aid the patient in building up a good nervous, physical, and psychic equilibrium Tuberculin has a definite and distinct place in stimulating tuberculous lesions and aiding in cure, pneumothorax has proved to be of distinct value in a certain group of cases, and certain climates make it easier and more comfortable for the patient and because of special conditions which exist, add a certain percentage to the patient's chances of getting well; yet these factors are not the principal ones to be used in treatment. These factors are beyond the reach of many patients because the great group of general practitioners are not able to employ them Fortunately, however, patients can get well without them. If early diagnoses could be made and intelligent treatment could be applied immediately they would not be so necessary, because most patients could be handled successfully by general physiological measures.

Rest is one of the most important and most helpful measures that can be used in the treatment of tuberculosis. Every patient who has active tuberculosis should be put to bed and taught to relax and rest. This should be continued until all periods of active toxemia are past and the patient can exercise without danger of causing toxic symptoms. This may mean three months in early cases; it may mean six, eight, twelve or even more in the advanced cases. And during all this time the physician mus keep the patient happy and contented so that he wil cooperate wholeheartedly.

Food is an important factor. It is not necessary to overfeed tuberculous patients. No person eithe with or without tuberculosis can ingest the large quantities of food that are often given for a long period of time without doing himself untold harm The tuberculous patient requires a full, but not an excessive diet. He is not necessarily making headway against his tuberculosis in proportion to the weight that he acquires. Three good meals a day consisting of foods of all classes, including a plentiful supply of those rich in vitamines, such as milk, eggs, and green vegetables, is the best for most patients. There are exceptions, of course, where special diets are required and forced feeding may be advantageously resorted to for a brief time now and then, but the regular diet should be a well balanced one, liberal but not excessive.

Exercise becomes as important a part of the treatment, when the time for its employment comes, as is rest when it is indicated. Rest is employed most frequently in the early period of treatment, and exercise in the latter part, rest during the stages of activity, exercise when the process has become quiescent. When the patient can exercise without causing toxic symptoms and without tiring, a certain amount of it should be employed. It requires judgment to tell when a patient can exercise safely, and even more to prescribe the amount of exercise which will be beneficial and not harmful. After a prolonged period of rest, exercise must be prescribed cautiously. I usually get the patient up slowly, not increasing the time of sitting up at first more than ten minutes a day. After a patient has been sitting up three hours without tiring, I let him play around outside of his room or bungalow until he gets accustomed to light exercise. After this procedure has been followed for a few days, walking is begun. At first the distance forward is increased by fifty feet a day; later it is increased by a hundred or two hundred feet. By this cautious program the physical force of the patient is increased and physical vigor is gradually acquired. Patients may attain a maximum distance of anything from half a mile or a mile to five or ten miles a day, varying according to the condition and physical strength of the individual.

This exercise, after the disease has reached the quiescent stage, is a very important part of the treatment. It must be carried out carefully and not haphazardly. Everything that is done for the tuberculous patient should be done with care and exactness. The time in bed, the exercise, the food, the way to make best use of open air, the mental attitude; in fact, everything must be prescribed in minutiæ for each patient. Generalizations have a bad influence and usually result in a poor régime and a poor cooperation. I know of nothing more hazardous to the tuberculous patient than overexertion, and by overexertion I mean the use of more exercise than the patient should take at the time, in consideration of his condition.

It is no longer necessary to insist that the tuberculous patient should be treated in the open air, because this is now as positive as the plus sign in algebra. It is necessary, however, to explain what open air means, what there is in it that is so superior to closed rooms, and tell the patient how to get most good out of it. Our ideas regarding open air have changed very much since we have learned that it is the mechanical effects of the impact of the moving air upon the delicate nerves of the skin, and not the oxygen content, that makes open air so superior to the air in closed rooms. Some patients fear drafts of air. If they will live entirely in the open, or in rooms with large openings instead of small windows, they will avoid the force of the air which is present when forced through small openings and which is commonly known as drafts, and get the full benefit of the moving air without getting its chilling effects.

Heliotherapy is a valuable adjunct to treatment. Any physician can prescribe sun treatment intelligently if only he will master the principles underlying its use. It is not suitable for employment in patients with elevation of temperature. When treatment is started the time of exposure should be increased gradually. At first a small area should be exposed, and this should be increased each day until the entire body is exposed. The time of exposure, too, should be increased by about ten minutes a day until an hour has been attained. While taking sun baths, patients may either lie down, sit or walk according to their desires, their physical strength, and the arrangements for privacy. Trunks of a bathing suit are very convenient to wear during sun baths. The patient's head should be shielded from the sun during the bath, and if faintness or headache should supervene, cold clothes or ice should be applied to the head. While the sun's rays in the mountains, the desert and at the seashore may be most efficacious because of their greater content of chemical rays, value can be derived from this measure wherever the sun shines.

THE PERSONAL ELEMENT.

The most serious thing in the treatment of tuberculosis is that the measures which are generally used in treatment are so simple that their application is difficult. There is no pill to take, no liquid to swallow, no injection to give which may be considered as specific, neither is there a part to eliminate surgically. To carry out an effective program often needs some adjunct, something which will bring patient and physician together often, and give them what seems to be an intelligent and legitimate reason for coming together. For this purpose there are many remedies which may be used advantageously, such as hypodermic preparations of iron and arsenic. But the real thing that makes such visits worth while is a sincere and intelligent interest in the progress of the patient.

There are many measures that can be utilized for making those who are suffering from advanced tuberculosis more comfortable as well as aiding them in fighting their disease. Instructions regarding cough, and measures for its relief at times are very helpful. The administration of bromides, when patients are nervous, and careful attention to the gastrointestinal tract are very important. There is one further suggestion that I desire to make which not only adds to the comfort of the patient, but also greatly increases his resistance. All patients suffering from the chronic toxemia of tuberculosis have a certain degree of acidosis, under which condition the free water of the body is reduced in amount. To be sure, this acidosis is of much milder degree than that found in such diseases as diabetes, nevertheless its presence reacts to the detriment of the patient and interferes with his sense of well being.

During the last four or five years we have been attempting to relieve this acidosis by the use of alkalies and water. At first we used it only in rare instances, but now we use it quite generally. We have employed alkalies, such as bicarbonate of sodium and magnesium, by the mouth. We have also employed them intravenously and by the Murphy drip. The consumption of large quantities of water should be encouraged at the time alkalies are being administered. Some of my patients take as much as twelve and fourteen glasses of water a day during the toxic period. The Murphy drip has seemed to us so far to be the most practical method of alkalization in tuberculosis. We use a solution of from three to five per cent. of bicarbonate of sodium in water and allow it to flow into the rectum drop by drop. We keep this up for three or four hours a day. With patients who are suffering from continuous elevation of temperature we sometimes use it every day for a month or more. As a rule, however, we use it for three or four weeks, discontinue for a few days, and then resume it again. The effect of this is to decrease the harmful action of the toxins. Patients sleep better, their appetite improves, and their temperature frequently lowers gradually. The influence seems to be that of improving the general physiological reactions of the patient. The beneficial effects can be readily understood from the work of Fischer, and Woodyatt and Sansum, in which they show the detrimental effects produced upon the organism when the colloidal substances of the tissues take up large quantities of water, thus reducing the free water of the body. Their work shows that the presence of free water in the body is essential to healthy activity of the cells. Our experience in the administration of water and alkalies upholds their theories.

CONTAGION.

Aside from prescribing a course which is intended to aid the patient's recovery, it is the duty of the physician to instruct the patient so that he will conduct himself in such a manner as not to endanger others. Explicit instructions in personal and general hygiene must be given. Directions for the care and disposal of sputum and for the prevention of the spread of infection, particularly among children, should be especially emphasized. The patient should be encouraged in following these instructions by the knowledge that if he follows them carefully and conscientiously he is not endangering his friends and associates.

It is universally recognized by tuberculosis workers that the burden of early diagnosis, cure and prevention of tuberculosis is upon the general practitioner. If this is true, it is the duty of those who are interested in its prevention and cure to dispel the pessimism which prevents the practitioner from doing what he should for those suffering from this disease. In our discussions of diagnosis of tuberculosis we, as specialists, make the subject too intricate, and by so doing fail to help the profession in general as much as we should. My experience indicates that probably eighty or ninety per cent. of patients suffering from active clinical tuberculosis could have a diagnosis made by so simple a measure as analyzing the symptoms, and this the general practitioner can do if he familiarizes himself with them. It is further his duty to be able to carry out the common measures in treatment, even though he does not feel competent to handle the special measures which are used by specialists. If only such an attitude toward tuberculosis could be secured on the part of the medical profession in general it would have a tremendous influence in the relief of those who are ill and in the prevention and the spread of the disease.

Early Diagnosis of Brain Tumors Before Eye Signs Occur

Differentiation from Encephalitis, and from Hysteria and Emotivity

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When a patient is presented because of unusual peculiarities of behavior, vague sensations, perhaps occasional dizziness, an undue tearfulness, an unaccustomed looseness of talk or irascibility, with impaired efficiency for work, it is all too common for the practitioner to infer that he is dealing with a case of hysteria. This is true even of one who has studied the mechanism of hysteria, for most persons have in their lives the breeding places of psychological disaffection, which readily manifest themselves when they are sick, and may easily be mistaken for a psychogenic disturbance by those who lack general neurological experience. A common illustration of this contingency is the manifestation of delirium in the course of infections. Delirium is a psychological disturbance, the material of which is habitually the patient's normal preoccupations, those of his daily tasks, of his domestic life, of his personal leanings and ambitions. To deal with them psychotherapeutically, however, we all know to be futile, as they are merely ebullitions of disordered chemistry in the brain.

Now a hysteriform syndrome is a common initial manifestation of the presence of a new growth in the brain. The difficulty of the diagnosis is further complicated by the error perpetuated in textbooks that the alterations of the visual fields in these cases are stigmata of hysteria. This error is based upon two observations: first, cases with a true restriction of the visual field, diagnosed as hysteria and regarded as such without subsequent observation of the case having revealed the true cause as a lesion. The second source of error is due to faulty methods of observation by ophthalmologists who have dealt with hysterical patients without realizing their facile suggestibility and in whom, consequently, they have suggested by the method of examination alterations of the color fields, notably the well known inversion by which the blue field becomes smaller than the red.

Nowadays we know that inversion of color fields or restriction of the form field are indicative of physical damage and are not characteristic of hysterical patients who are properly examined.

Another drawback to early diagnosis in brain tumor is the belief, implicit in many practitioners, that one must find a swelling of the optic disc as well as vomiting and complaints of headache before making a diagnosis of tumor. Now these symptoms come late and are indicative of merely greatly increased intracranial tension. Indeed, the general disturbances indicated by these signs often mask the local disturbances caused the the lesion, so that it can no longer be localized clinically. The diagnosis must be made before the onset of papilledema, before severe vomiting, and before general diffuse headache. A local headache, however, may be an early sign. Dizziness, too, may be a local sign of a lesion of the posterior fossa, and vomiting may also be provoked by a tumor which presses upon the medulla. These tumors, however, are the easiest to locate on account of the abundance of the sensory and motor structures traversing the region.

The most difficult tumors to detect are those in the cerebrum itself, unless they implicate one of the great sensory areas or impinge upon the psychomotor zone of Rolando, or unless they affect the apparatus of speech. If only the associational areas are touched, the mental disturbances may be so insidious as to escape detection for a long time; because the chance of receiving a neurological examination is very small.

Another complication making the diagnosis difficult is arterial hypertension; for the signs found may then be attributed to arteriosclerotic lesions. It must be remembered, however, that hypertension may be secondary to disturbances of the vasomotor centre. Thus I was consulted in South Carolina by the physician of a man who had had an apoplectic attack in November with a blood pressure of 198. I found him torpid and aphasic, with headache localized to the left temple and weakness of the right arm and leg. The right abdominal reflex was absent, the right plantar in extension, the right cremaster diminished. There was right extensor response of great toe, exaggeration of deep reflexes, substitutive aphasia and poor comprehension, without dysarthria and automatic speech comparatively good. The spinal fluid was not pathological. The headache was much aggravated when he sat up suddenly. There was slight diplopia with strabismus, facial asymmetry but no hemianopsia nor tremor. The most significant feature was the comparative recovery in January with a sudden relapse in February, although the blood pressure was at the time only 140. The man, aged forty-four, was in rugged health in other respects.

The localization of pain and the focalization of all the physical signs in spite of the torpor indicated a neoplasm rather than arteriosclerotic lesions in this case. Operation was recommended, but I have not heard of the result.

This case may be contrasted with that of a man of twenty-two seen at the same time, three weeks after sudden feelings of distress followed by excited delirium and later by torpor. Examination showed an enfeebled left achilles, and diminution of the right abdominal reflex, a dull facies, a diminished diadochocinesis and slight jerky tremor on movement, with sluggish and wide pupils. The suddenness of this attack in a young man, with the diffusion and variety of the physical signs, pointed to epidemic encephalitis as the cause of his condition.

Another case seen about the same time was also characterized by delirium followed by coma of acute onset. In this case, however, there were also coating of the tongue followed by extreme redness, pain in the chest, marked loss of appetite ,with emaciation and severe constipation, roughness of the skin and no neurological signs except sluggish motility and mentality. There was a history of more or less restriction of food during the winter to corn and molasses, on account of the poverty which was caused by the sudden fall in price of cotton. The diagnosis made then was pellagra.

Both in pellagra and encephalitis, however, focal signs may be conspicuous. In that case they may be difficult to distinguish, unless the patient is seen during the acute stage or a good history is obtained. However, it is unusual to find as intense an impairment of function as would be caused by a neoplasm, nor would the signs be widespread unless there were also the classical signs of headache, vomiting and papilledema, along with modification of the visual field. The total clinical picture is also generally distinctive to an experienced neurologist. If it is not, the progress of the case will enable a diagnosis to be made before it is too late to intervene surgically if one is dealing with a neoplasm.

The diagnosis from hysteria may be quite difficult when no physical signs have occurred, and when flighty behavior is the only symptom. Patients whose cerebrum is impaired show an increased suggestibility. This is a familiar finding in states of mental confusion resulting from intoxication. Encephalitis, however, resembles the latter in that there is an impaired fixation of attention, and the ductility, as regards any particular stimulus, is evanescent; while in the hysterical patient the suggestion tends to be tenacious. Furthermore, hysteria should never be diagnosed by exclusion, but only after the discovery of the suggestion which has determined the hysterical behavior.

The erroneous doctrine that physical disturbances may be of hysterical origin must not be allowed to influence the clinical diagnosis in the study of these cases, as has occurred in a local instance recently. The weak suggestibility due to encephalitis was the foundation of an erroneous diagnosis of hysteria in a case recently seen in North Carolina, although lethargy was present and partial ptosis had occurred.

In encephalitis the most difficult differential diagnosis of all is from the mild acute psychopathies, with or without delirium. In these cases the diagnosis can be made only by watching the course of the disease, or by the finding of lymphocytosis of the spinal fluid.

1746 K STREET.

The Unconscious in Spirit Communication and Symbolism*

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I shall attempt, in this paper, to emphasize a point in connection with spiritualism and Freudian psychoanalysis, in the effort to make plain the psychologists' fundamental objection to the concept of unconscious mind and unconscious mental processes. This objection is not always clear to the laymen, to many of whom it seems that the psychologist merely accepts the facts, but objects to the terms which the psychiatrist and the psychoanalyst use.

There is, in certain of the phenomena of mediumship a basis of belief, on the part of the medium himself or herself (usually herself), and that basis of belief is a matter which is important both theoretically and practically.

In certain types of mediumship which may be called the natural type, there is no pretense of supernatural physical manifestations; but the medium speaks or writes in a normal manner. The only question of authenticity in connection with such mediumships concerns the validity of the information received. The question is whether the information given is or is not true: whether the statements concerning objects or events at a distance in time or space can or cannot be verified.

As psychologists, we may suspect that such validity cannot be certified in any definite way; but that is not the point which interests me now. The present problem concerns the apparent fact that mediums, or, at least, some mediums, of this natural type, do themselves believe that there is a supernatural source of information for some of that which they write, or speak, or communicate in some other perfectly commonplace way. I am inclined to believe that even many mediums who deliberately fake a great part of their communications, do honestly believe that some of the things they communicate are contributed by minds other than their own; that they believe that a part of what they produce is genuine revelation; in spite of the fact that they deliberately add a great deal more.

Assuming that there is, on the part of many such mediums, a genuine belief in an external source of a part of their communications, the reason for that belief (call it selfdeception, or what you will), is an important thing for both pure and applied psychology. There are two important points upon which mediums insist, in support of their claims. In the first place, they say that they cannot intentionally write or speak as fluently or as adequately as they write or speak when under what they assume to be the control of the spirits. They assert that the quality of their production, so far as style and fluency goes, far surpasses the quality of anything they have been able to produce when working deliberately. Secondly, they say, as regards the content of the communications, that they express themselves on points concerning which they have previously had no definite thoughts. They assert that there is a substantial attainment in form and content in their mediumistic communications beyond the limits of form and content which they are able to obtain in ordinary, deliberate composition. While admitting the very strong probability that on both of these points they exaggerate, particularly in regard to the content, I am inclined to suppose there is a certain amount of truth in these contentions. Though it will not be found true that the medium has not previously thought along the lines of her communications, it may nevertheless be true that along lines on which she before had only vague notions, she finds herself, to her surprise, making definite statements: and it is probably true that the fluency and form of the communications really impress her. I am inclined to think that the two points which the mediums put forth as evidence that they are inspired are of some validity psychologically, although incompetent to prove the assertion of inspiration.

In order to appreciate the force of this validity, we must consider the psychological conditions of ordinary extemporaneous composition. The more deliberate sort of composition probably proceeds along the same lines as the extemporaneous, but it is advantageous to consider first the extreme form of extemporaneous composition, namely, extemporaneous speaking.

Suppose that someone unexpectedly asks me to give an account of a committee meeting which occurred last week; and suppose that I have not, in the interval between the meeting and the request, thought over the matter at all. During the meeting, the matters at issue were so important and the situation so intense that I had no thought at the time regarding a subsequent report to anyone: and I have had no opportunity later to review the circumstances. Yet, on request, I give a more or less coherent account of the meeting, and may express definite conclusions on points on which I had not before had a specific opinion. Do I think of each item in my account before I speak it, and then speak it? Most decidedly I do not. I just say it; and in so far as there is a thinking process involved, it is not only simultaneous with the speaking, but is identical with the speaking. There is, in short, one process, which to myself and to the listener is the speaking and thinking process. The absolutely certain thing is that I do not think first, and then speak. When, in other cases, I do separate the thinking and speaking, the listener knows that I am halting. In this less fluent presentation, the thinking, which is sandwiched in, is really inner speech. I say something inwardly to myself, and if satisfied with the form and content, next say it aloud: and in this case, the inward speech occurs in precisely the same way as the outward speech in the more fluent case.

The doctrine that thought is always a form of reaction, following the same laws as every other reaction of the organism, and to be scientifically understood on the common basis of integrative action of the nervous system, is a doctrine I have long been emphasizing, and which I think is an important matter for psychological progress. It is true, unfortunately, that some other psychologists, in taking up this hypothesis, have pushed it to an unwarranted length, and have asserted that all thought is not only a reaction process, but is specifically a speech reaction: which is a mistake. The original and more general hypothesis is, I think, solid. In the case of composition, the reaction is, of course, a speech reaction. Whatever reactions I may use in thinking under other circumstances, here I am using the reaction of the vocal mechanism as a vehicle of thought.

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In writing (contrasted now with speaking) there are various forms of free composition. By free written composition, I mean composition which has not been formulated before the time at which it is committed to writing. In my own case, I often find myself spelling out letters vocally as I write. In other cases, I do not spell the words out vocally as I write them, but I vocalize the material in batches: in clauses, sentences, and parts of sentences: and after thus formulating each fragment, write it without further vocalizing. There are still other methods. Some writers tell me that they do not, in general, vocalize at all, but that they think the material by the very arm and finger movements which write it. There is no doubt that the introspection of these writers is correct, for the possibility of thinking in this way, without any vocal reactions, may be demonstrated by observation in the use of the typewriter and adding machine.

Obviously, in writing, there is a chance of correcting, supplementing, and expanding, which is not so largely possible or desirable in verbal speech: but nevertheless, the process is fundamentally the same as in vocal composition, which is the more usual process, whether the final expression be spoken or written.

Now, whether speaking or writing, every fluent speaker or writer may notice, when he directs his attention to this phenomena, that the words and thoughts embodied, no matter whether first arranged graphically or vocally, arrange themselves automatically as they are spoken or written; and on analytical consideration, we fail to find any other way in which they can become arranged. I shall confine my further explanations rather closely to speaking, since in writing there are a variety of intermittent processes.

In extemporaneous speaking, the words automatically group or arrange themselves. The speaker is not conscious in advance of the arrangement: he is merely conscious of the arrangement as it occurs. When you first think what you are going to say and they say it, your speech is never fluent: such alternating procedure is the most pernicious factor in preventing fluency. When you are fluent, the thought and language process occurs but once: ideas are not present until the moment of expression. The expression is the thinking. It is true that they might have been present an hour or ten minutes ago; as when you have memorized or otherwise prepared a speech; but not while you are fluently speaking. In the less fluent method of speech, thinking and then speaking, the thinking is the process corresponding to the speaking of the more fluent case.

There are various reasons why the results of compositions may be unsatisfactory. In the first place, the speaker may not have digested enough information on the subject; that is, there may not be at his command materials on which those processes of thinking may work. Materials, as the term is used here, are preformed reaction habits; preformed, like all habits, by previous reactions; and the process of preformation of the reaction habits is, in these cases, called study. Secondly, there may be constitutional ineptitude. Some individuals may prepare heavily and deeply on a certain subject and then may not be able to talk or write on it. They haven't the capacity for this type of reaction. This inadequacy is different from the lack of preparation—the lack of materials out of which construction may be made. In the third place, bad emotional conditions interfere with the composition. Bad emotional conditions include one factor of great importance and common occurrence—namely, lack of confidence. Lack of confidence in the results of your composition has, necessarily, a disastrous effect. Fourthly, there may be bad thought habits of many kinds. These are four types of conditions which interfere with the process of putting words together well.

Let us consider now the person of poor training, or poor constitutional aptitude, or both, who composes very badly. If you can increase that person's selfconfidence, and give her freedom from usual criteria—make her feel, for example, that it does not matter much whether the results of her composition are logically coherent or not—you will improve that person's composition very much. It will have a coherence which at times will be surprising, and will unquestionably have a fluency, which will be superior to that of the person's formulations under ordinary conditions. This is the reason very good free verse can be composed by persons who are totally incapable of writing real poetry. Such a case is like that of a poor dancer, who is inaccurate and awkward. When he dances among people who dance well, he feels incompetent and dances at his worst. If, however, you tell him to get on the floor and do just anything he can: make any sort of movement which comes easily: his performance will be more satisfactory to himself, and sometimes to others, and will certainly be more copious. Giving him selfconfidence and freedom from criticism will help him even to be less awkward.

One innocent of any psychological sophistication, when placed under conditions where selfconfidence is maximal, and where the necessity of finishing things as you have begun them is removed, will be astonished at her increased fluency: and when her attention is called strongly to the fact which any fluent speaker and writer can notice, namely, that one does not compose consciously what one is writing or thinking; that one does not consciously put it together, but that it just comes it will be natural for her to conclude that the composition is a supernatural product. Since she does not compose it, she concludes that someone else must. "As I do not compose it, it must be composed by a spirit."

The psychologically important question is: Where does this composition arise? If I do not deliberately put these words together in the order in which they flow, then what does? And an answer of a sort can be very easily given—the work is done by the unconscious mind. Since I am conscious of the result, of a formed current of thought, of whose forming I am not conscious, I might conclude that the elaboration of the material takes place in an unconscious department of my mind.

This explanation has been suggested in the past. I have no objection to this statement in itself. It is perfectly true. But it is not an explanation; it is merely a name for conditions which need explanation, and using this name as an explanatory process masks the real problem. To try to explain this phenomena by saying it is done by the unconscious is very much like explaining thunder and lightning by saying "God does it," which may be perfectly true; but which does not get us anywhere. What we want to know is—what are the specific details which lead up to the phenomenon?

In the case of the unconscious elaboration of literary products, we want to know how this elaboration occurs; and we want to know for two purposes: first, for the satisfaction of our scientific curiosity, and second, in order that we may improve the technic of composition and get better results; and also that we may remedy certain difficulties in composition, especially vocal composition, experienced by people whom we call stammerers.

If we approach the problem from the point of view of habit, which I think is the true approach to any problem of the socalled unconscious, we will get the best results. Let us consider, first, the case in which I memorize what we have to say. I might write out something, and then, after I memorize it, speak it. That process is different from extemporaneous composition; but it is different in that it brings in a very definite and extended process of habit formation. If I have composed the thing myself, it is the first composition which is important. If someone else has composed it, there is merely perceptual repetition involved in my learning. In any case, I have formed, through proper repetition, a habit of doing a thing in a certain way. In another case, I might not memorize, but I might prepare what I am going to say, and this preparation involves habit formation of a different kind. In such preparation, we connect together our larger groups of activities, even though those groups of activities form a schedule not worked out as regards their internal structure. We may elaborate some of the details of the topics, without elaborating the other details; we thus form minor habits—thus go over certain sequences, in order that when those sequences are brought in, even if we have not predetermined the point at which they are to come in, they will nevertheless occur in an approximately predetermined fashion. Of course, the method in writing may be somewhat different.

In the case most easily studied, the case of speaking, one problem is the removal of bad habits. There is one habit which now seems to me the special vice of many stammerers, and that is the vice of interfering intentionally with the process of composition while it is going on. The consideration of this bad habit has certain value in connection with the whole process of composition. If my hypothesis as to composition is right, it is better to let the process occur as it may; and if it does not turn out satisfactorily, to reword it. What many stammerers do, is to cultivate either apprehension of bad results, or a general dissatisfaction with the formation of expression. Some men can never start a sentence without becoming immediately dissatisfied, and changing the form of expression before it is completed. That habit is one which is observed in many stammerers, though not in all. In the case of some stammerers, it is present in a marked degree. I am of the opinion that it is a verbal habit which can be broken by a simple course of treatment, and the advice I am giving in such cases is: "keep your hands off composition while it is going on. Let words flow naturally; do not interfere with the verbal formulation while speaking. Let the mechanism operate naturally, without fear of saying the wrong thing, or of not saying it in absolutely the best way. Avoid modifying and interfering with what you are saying while you are saying it." I am sure this is good advice: and it throws some light on the process of composition as a rather automatic one; that is, below conscious levels.

Now, with writing it is different. Conditions are more under your control, and you can stop your pen, if you want to, for a certain length of time. read what you have written, and then go on from the point of interruption, with a different sequence, if you prefer. You cannot do this in speaking. We do not call this interrupted writing stammering. I am not speaking now of repeating a word, which so many people who are not confirmed stammerers do: but of a more general type of stammering. We say certain people stammer when they talk, and do not stammer when they write. As a matter of fact, we all stammer when we write. I should say that, even in writing, it is advisable to stammer as little as possible. I find in my own writing that I get better results if I write a rough draft as fluently as I can, interrupting the process of composition as little as possible, and then, when it is finished, go back over it and revise. Certainly, in speaking, the habit of not finishing what you have to say may be a beginning of a very bad speech defect, and is inadvisable as a general thing. The practical rules in the case of speaking, and to some extent also in writing, are the same as in the playing of billiards—do not change your plan at the moment of making a shot. Plan beforehand; when it comes to the actual movement, go ahead, and if you make a bad shot, plan to do it differently next time.

So much for the foundation of the medium's belief in inspiration, and its interpretation on ordinary psychological grounds, rather than in terms of unconscious mind.

There is another aspect of the conception of unconscious mental activities which is involved in the Freudian notion of unconscious symbolism. As I understand this theory, it is maintained that certain objects or designs, which have been for our ancestors conscious symbols of sex organs or sex functions, are unconsciously recognized now by us, who know nothing of the historical use of these symbols. As an instance of the application of this theory, I may mention the two isosceles triangles, one base down, the other base up; ancient symbols for the male and the female respectively. Very few persons at the present day know that these forms were extensively used, or were used at all, as sex symbols in the past; yet these two forms, especially the female triangle, are used very extensively in art, and especially in advertising. Both the six pointed star and the five pointed star are also extensively used, and used practically without exception in positions (one point down for the six pointed; two points down for the five pointed) which indicate their historical foundation as the combinations of the male and female triangles in the one case, and of the female triangle with the arrow head (which, of course, is merely a variant of the male triangle) in the other case: that is, as signs of copulation. The fact that both of these stars are, even at the present day, used as symbols of perfection also indicates their historical origin: perfection, in ancient cultures, being associated with copulation.

Now, it is quite in a line with Freudian theory, particularly as developed by Jung and his school, to say that the present day preference or fondness for these triangles is a manifestation of the unconscious libido; an effect on the conscious level produced by the unconscious recognition of these as sex symbols. The particular application of the theory of the unconscious libido to these two symbols has been guaranteed to me by a number of Freudians, who have maintained that therein lies sufficient explanation for the wide use of these two triangles in our times, and also for the preferential use of the female triangle, since designers and advertisers are predominately male.

This method of explanation is one which psychologists very strongly question, since it seems to them not only to cut off the attempt at real explanation, but to magnify the confusion of the mental with the nonmental. We would rather look for the explanation along the prosaic lines of the known laws of habit formation. It has occurred to me that because of the general ignorance as to the historical meaning of these symbols, they offer an excellent point for experimentation, and it is, of course, experimental test to which the psychologist always looks for the settling of disputed points.

In the attempt to develop experimental methods of attack on this problem, I have had prepared sheets bearing two pairs of triangles, in each pair a male and a female triangle, one pair being in outline, and the other filled in with a uniform ground. In submitting these triangle sheets to reactors, I ask them first to indicate, by an appropriate mark, which of the two triangles in the first pair they prefer as a mere art form, and, again, which of the two in the second pair they prefer in the same way. Then, I ask them to decide which of each pair they would use as a basis for an advertising device or trade mark for a line of heavy machinery. Next (in the case of male reactors) which they prefer as a basis for an advertising device or trade mark for a line of men's clothing; next, a similar choice for a line of women's clothing (for women reactors, the order of these choices is inverted); next, a choice for use in designing a jeweled badge; and, finally, how they would use them if one triangle had to be used to indicate the male and the other triangle the female sex. I require the choice in this order, so that the simpler choices shall not be influenced by those in which the idea of sex is covertly introduced, nor these by those in which the idea of sex is explicitly introduced.

If these tests are made on large numbers of males and females, we might formulate in addition the results which should be expected on the Freudian hypothesis, and also the results which might be expected on the psychologist's hypotheses. I should expect, for example, if the preferences are due to an inherited tendency to an unconscious preference, which is nevertheless distinctly sexual in character, to find that the majority of males would prefer the female triangle, and that the majority preference of the females, although not so decided as the majority preference of the males, would be for the male triangle. If, on the other hand, the Freudian hypothesis does not apply, I should expect to find a practical indifference in the feminine choices, but a definite tendency towards the preference for the female triangle by the males, which tendency should be slight or negligible in the younger males, increasing with the stage of experience. These preliminary expectations are, of course, subject to modification on the basis of the data obtained. This work is in progress, and the data so far obtained has not been completely analyzed, but apparently the expectations of the psychological basis are justified. So far, in data obtained from college students, there is no discernible effect of mere chronological age, but a difference due to academic age, that is, to college year. The difference between upper classmen and lower classmen is marked. This is, of course, a critical point, for we might assume that an unconscious preference tendency might develop with the ripening of the organism just as other instinctive tendencies do develop. If we find, on a larger scale, that chronological use has no decided effect, but that experiential age does, the facts would so far seem to fit in the ordinary lines of psychological explanation.

We know that many of our conscious processes are determined by conscious processes of the past, which have modified the nervous mechanism, but of which no conscious trace remains. In writing my name, for example, I am carrying out the conscious process which is due to the painfully conscious writing attempts of my childhood; yet there is no reason for supposing that in the actual writing process, when I sign my name on a check, there is any survival of these former processes at any level, even an unconscious survival. The situation is precisely the same as in the case of an automobile engine, whose function is due to a vast number of manufacturing processes in the past, but which are not involved in the actual running of the engine. Conscious processes of the past have modified my nervous mechanism so that its functions, including its conscious function, at the present, are different from those which would occur if these past forces had not operated.

In preferring the female triangle to the male triangle, it is not necessary that there should be present in the mind of the chooser any sex reference whatsoever. But, nevertheless, his preference may be due to habits of interest formed in the past in full consciousness. No conception of unconscious or subconscious mental activities is necessary. If an especial interest in the female triangle has been aroused in the past, the tendency for that interest to recur when the form is presented at some later time begins to be established. The more frequent the experience, and the more vividly emotional the experience, whether based on actual observation of the mons veneris or on pictorial representations, the more definite the tendency becomes, and the more probable its action.

Whether this particular experiment issues into definite conclusions or not, I feel that the direction of work is right, and that we must seek experimental methods of attack rather than rest satisfied at the level of reasoning by analogy. There is great scientific advantage in holding on to the concept of the mental as determined by consciousness, avoiding the use of such a vague concept as unconscious mental processes. Scientific psychology insists that the mental, or conscious reactions, are influenced by, and influence, all other reactions of the organism: and that if any of the unconscious processes are called mental, all of them should be: which is equivalent to abandoning the term mental. The use of concepts of unconscious mentality, applying to some, but not all, unconscious reactions, necessarily drags in the assumption of a differentiating principle which is not revealed by experience; which is not a necessary explanatory principle, and which hence is mystical. Experimental work should be the ultimate factor in deciding whether we can hold to the simpler concepts, or must admit concepts which are not amenable to established lines of biology and psychology.

Environment and Trained Assistants as Factors in the Success of Cataract Extraction and Other Eye Operations

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Many failures in cataract extraction and other delicate eye operations, especially those done under local anesthesia, can be directly traced to improper environment, lack of preparation of the patient for the ordeal, poor assistants, and faulty operating room technic.

ENVIRONMENT.

The majority of cataract operations are performed on elderly persons, who, because of the infirmities of old age, are timid, lack stamina and will power, or, in other words, are somewhat childish. Their whims and peculiarities should be studied, and an attempt made to gain their confidence. Every effort should be made to make their surroundings similar to those with which they are accustomed.

Many old people wear heavy underwear, chest protectors, abdominal bands, wristlets, anklets, etc., and bring these things with them to the hospital. They are often entirely deprived of this accustomed clothing, given unbleached muslin night gowns, placed in beds hardly large enough in which to turn, and which often lack proper covering.

After being in the hospital a day or two, during which time their face is scrubbed and the eye is dressed, they are placed on a stretcher, wheeled into an elevator and after having been bumped into doors or quickly turned around and altogether roughly handled, they are conveyed to the operating room; during this time the eyes are closed by a bandage. They are then compelled to lift themselves to the operating table, or are roughly placed on it by a none too clean or good humored orderly. After going through this ordeal, we expect the patient to be resigned and docile, calm and trustful of the operator and his assistants. In many instances this is the first time the operator or his assistant has seen the patient since he or she entered the hospital.

In order to comprehend fully the state of mind of the patient, we must endeavor to place ourselves in his or her position. Recently a surgeon related to me an experience with a highly nervous patient, who suffered the loss of an eye because a resident physician, coming into the operating room slammed the door, which caused the patient to jump, squeeze out the speculum and nearly empty the globe of vitreous. We all have had the experience of having two or three members of the staff come into the operating room laughing and talking loudly just at the critical moment in a cataract operation.

I would recommend that every patient coming for a cataract operation be thoroughly studied from the viewpoint of environment. We should see that they are comfortably housed in wards or private rooms, that the usual routine examination, such as smears or cultures from conjunctival sac, urinary analysis, intraocular tension, blood pressure, etc., are made and the results of these examinations recorded on the chart before the operation. Some oculists visit their patients and instruct them in the necessary procedures, such as looking up and down, refraining from squeezing the lids and lifting the head. In this way they gain the confidence and cooperation of the patient.

TRAINED ASSISTANTS.

Every ophthalmologist should have the ambition not only to be a good operator, but to be able to say that he has trained other men to be as good or better than himself. He should aspire to create in the minds of the younger men an ambition to work and to cooperate closely with him in creating, in its minutest detail, a rational operating technic, so that in case of emergency, he can call on his first assistant and have the satisfaction of knowing the work will be done as well as though he did it himself. No operator should think he is so great that men will seek the privilege of working for him. There is a great difference between working *with* and *for* a man. Good and ambitious men will not work for a man without pay; at least not after they have picked up enough knowledge to do the work themselves. By this I mean, that compensation must be in the form of monetary consideration, or in the experience gained by working with a chief who is willing to impart knowledge and to discuss with his assistants the whys and wherefores, and the best methods of procedure in the individual case. A chief who does not appreciate this is constantly annoyed with new and untried assistants.

Of course, there are some men who work alone and often get excellent results with the aid of nurses and green assistants, but, as a rule, they are men of limited experience and ability, who really never get beyond a certain level. It would be an excellent thing for the patient if two good operators would combine and agree to help each other in their operations, the one who happens to assist, schooling himself during the operation to keep in the place he has assumed for the time. No man can acquire operating skill by holding trays and looking on. He must handle the instruments and have opportunity to practise on animal eyes, and try his hand on actual patients as his knowledge improves. It is up to the chief to provide such opportunities. The second and third assistants should be trained by the first assistant in the same manner and should have charge of the preparation of the patient, the instruments, and the general supervision of the operating room. A first class assistant knows the next move in a given operation and anticipates the needs of his chief; he should be going over the steps of the operation mentally.

OPERATING ROOM TECHNIC.

Wherever possible, the operating room should be near the wards and on the same floor. For operations that require opening the eyeball, the patient should be in a special bed, suitably arranged for operative work, which can be wheeled into the operating room. The patient should remain in this bed after the operation. The surgeon should be able to sit down while doing the operation. This plan is followed at some hospitals with excellent results. In these hospitals the bed is placed close to a large window, which insures excellent light. For capsulotomies, iridotomies, etc., the room can be darkened and a Zeigler photophore Smith lamp used for illumination. In this way the interior of the eye can be lighted up. The man who holds this light is an important factor, and at all times he should be able to see the field of operation distinctly, for if he sees it, the surgeon can see it also.

The eye to be operated on should be prepared by the second assistant, who will not touch the patient or the instruments again. After cleansing the outer surface of the lids with soap and water and washing them off with sterile water, the lid margins are cleansed with wet cotton tipped applicators, one for each lid, and the conjunctival sac is gently wiped out with fresh, wet, cotton tipped applicators; the conjunctival sac is flushed with warm boric or saline solution; an eye sheet with a circular opening two inches in diameter is placed over the face, exposing the eye to be operated on, and the patient is ready for operation.

PREPARATION OF INSTRUMENTS.

Noncutting instruments should be boiled in water containing carbonate of soda, in the proportion of a dram to a gallon, for thirty minutes; this will prevent rusting and will keep them in good condition. Cutting instruments for eye work cannot be boiled, so a method must be devised to secure, as nearly as possible, aseptic instruments. After trying many plans, I believe that the best way to sterilize delicate cutting instruments is to lay them in pure carbolic acid for ten minutes, then rinse them in sterile water, place them in ninety-five per cent. alcohol for fifteen minutes, and finally lay them in a tray of sterile water. In the bottom of each tray there should be a sterile gauze pad. They are then laid out on a table covered with a sterile sheet, in the order in which they are to be used in the operation. This saves confusion and enables the assistant to pick up quickly the needed instrument. They are then covered with a sterile towel until the surgeon is ready to use them.

Many operators carry their instruments with them. They may have a case scheduled for a definite hour, rush into the operating room five minutes before or on the hour, and expect the nurse to have the instruments ready by the time they have scrubbed up. If the following hour is taken up by another surgeon, they are pressed for time and the instruments are often improperly sterilized. Every operator who does much work should have a trained assistant to prepare his instruments, and to see, after the operation is finished, that they are properly cleaned and returned to their places in his case. If he does not have enough work to warrant this, he should go to the hospital early enough or leave his instruments there and instruct the operating room chief how to prepare them. Many infections are due to faulty technic in sterilizing instruments.

Cleaning instruments is an art. All instruments on which there is blood, pus, or tissue material, should be cleaned first with cold water, then boiled in water containing sodium bicarbonate and wiped thoroughly dry. If an instrument cannot be taken apart, it should be dipped in ether and allowed to dry. All screws and joints should be sprayed with an atomizer containing liquid petrolatum, or the petrolatum dropped on with an eye dropper. In all my instrument cases, I have small pads of sterile gauze made to fit the case and these I place on top of the instruments to take up any moisture present in the case. It pays to own a good specially made case in which the instruments can be properly kept.

Every surgeon who operates regularly should have in the operating room a list of the instruments ordinarily used for every important operation, thus avoiding the omission of an instrument which may be needed, and which is often imperfectly sterilized while the operation is going on.

It is annoying to know that your assistant is in a hurry and wants to leave early. I have seen an operator sterilize three sets of instruments for a given case and finally, in deciding upon the type of operation, be guided by the fact that it is late, or that there is a visitor present, or to gratify the desire of an assistant to leave early. There should be common ground upon which to stand in choosing the type of operation best suited for a given case. No hard and fast rule can be formulated because cases are not exactly alike and there are many legitimate exceptions, but an attempt at standardization can do no harm.

In our work we use the following instruction blank, crossing off the part not needed and underscoring the examinations desired.

WARD INSTRUCTIONS.

Name............................ Date................
Address......................... Diagnosis..............
If child, parent's name..............................

Immediate treatment—

Special Examination of the Underlined Requested Immediately.—Uranalysis; blood presure; blood count; blood; spinal Wassermann; nose, throat, and ear sinuses; transillumination of sinuses; cardiovascular; neurological; smear of conjunctival secretions; x ray of teeth; orbit; sinuses; localization of foreign body, skull.

Kindly prepare patient for operation on .... eye as follows:

General anesthesia—Prepare as usual, patients over sixteen to receive a hypodermic injection of morphine sulphate quarter of a grain, atropine sulphate one five-hundredth of a grain.

Narcoanesthesia—Patients to receive two and a half hours before time of operation, chloral hydrate ten grains, sodium bromide fifteen grains; repeat one hour later; one half hour before operation a hypodermic injection of morphine sulphate a quarter of a grain, atropine one one hundred and fiftieth of a grain.

Local preparation—Scrub face and cleanse eyebrows and lids, flush eye with warm boric solution, and place a sterile bandage on eye to be operated upon.

General preparation—Give cleansing enema.

Special preparation—

INSTRUCTIONS TO CHIEF OF OPERATING ROOM.

Date of operation.............. Time of operation.......

General anesthesia—

Local anesthesia—Three instillations of a four per cent. solution of cocaine, three drops each at three minute intervals. At last instillation add three drops of one in one thousand solution of adrenaline chloride and instill two drops solution of cocaine in opposite eye. Have on hand a twenty-five per cent. solution of argyrol, one per cent. solution of atropine sulphate, sterile warm boric or saline solution.

All cutting instruments to be placed on sterile cotton in pure carbolic acid for ten minutes, then rinsed off and placed in ninety-five per cent. alcohol for fifteen minutes, then placed in sterile water.

All other instruments to be boiled thirty minutes.

Please see that operation is posted on the board.

Name of operation.....................................
Recommended for admission by........................
Address...................... Phone............

CONCLUSION.

In conclusion, it is urged that a more careful study of the environment of the patient in the hospital be made; that we take more interest in the training of assistants, and try to open up to them larger opportunities; that close cooperation between the surgeon, assistants and operation room nurses be maintained; that a watchful eye be kept at all times on the care and preparation of instruments, and lastly, that we have fixed and definite ideas as to what we are to do, and not be led away by new fads or by every wind that blows.

2040 Chestnut Street.

Development and Problems of Modern Chemotherapy of Infectious Diseases

By H. SCHLOSSBERGER, M. D.,
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As far back as we can trace the history of medicine, it has been the aim of physicians to discover therapeutic measures which would affect the ultimate cause as well as the symptoms of ailments to which flesh is heir. This applies particularly to infectious diseases, with which we shall deal in the following pages, for in these affections the action of the disease producing virus can be most clearly discerned. As old as medicine itself is the recognition that symptomatic treatment in such affections is only an expression of our impotence, that therapy, on the contrary, can be expected to yield certain results only if it attacks the evil at its root.

Until recently any realization of the ideal of etiological treatment had been beset by extraordinary difficulties. Only in the latter part of the last century has medical research thrown some light on the mysteries of the etiology and pathology of infectious diseases. Considering the demoniacal character of these affections, it is not surprising that strange doctrines gained currency and that the infections became the source of many mystic conceptions. Thus, it had been impossible for medical knowledge to progress unswervingly on the right path as long as the nature of the ultimate cause of infection was unknown, and as long as medical thought was in the grip of superstitions and preconceived false conclusions. The physician had to be contented with strengthening the constitutional reserves of his patient to the best of his ability. Thus he aimed at influencing favorably the course of the disease by assisting the natural process of cure according to the Hippocratic axiom *natura sanat, medicus curat.*

On the whole, treatment was therefore empirical, and, from the modern point of view, it was a mixture of symptomatic and speculative methods. If we include certain hygienic measures such as isolation and Jenner's smallpox vaccination, we have practically exhausted the weapons which the physician could muster for his fight against infectious diseases until the end of last century. On the other hand, it shall not be denied that many findings of great pathological and therapeutic importance were collected in the course of past centuries. There can be no doubt that many facts which we may regard as precursors of our present etiological therapy, were brought to light by actual experience at the bedside of the patient.

In this connection we need only refer to the discovery of the curative properties of mercury and iodine in syphilis, of quinine in malaria, and of salicylic acid in rheumatic fever. However, only since the results, conceptions, and methods of exact science have been applied to medicine in recent years, has it become possible to approach the desired goal by systematic research. In view of the dependence of therapy on the doctrines of general pathology, which happened to hold sway at different periods, it would be a fundamental mistake to compare the accidental observations of physicians in the past with the successes of rational medicine of the present day. However, it would be just as wrong in a discussion of modern teachings, particularly of chemotherapy, to neglect the experiences which past centuries have collected concerning the treatment of infectious diseases. For, in spite of many aberrations, the knowledge of the past remains in the end the basis of our own conceptions and endeavors.

The first to recognize the character and mechanism of the etiological principles of therapy was presumably the famous English physician Thomas Sydenham. In a section of his *Opera Universa Medica,* written on the occasion of the discovery of the therapeutic properties of Peruvian bark, he ascribes to it a specific effect on the morbid matter—in other words on the malarial parasite—after its invasion into the tissues. He holds the future task of medicine to lie in the search for such other therapeutic agents as not only remove the symptoms of disease, but go to the root of the infection and radically remove it. Not less than two centuries had to elapse before the pioneer work of Louis Pasteur and Robert Koch brought nearer to realization Sydenham's ideal that a specific therapeutic agent, unlike mercury in the treatment of syphilis, must have no noxious effect on the tissues, or, to use Ehrlich's term, must show no organotropy.

Pasteur's great service consisted in recognizing that fermentive processes in the human and animal body are the result of the vital activity of microorganisms. His experiments concerning fermentation had led him to formulate the law of panspermia, i. e., the omnipresence of organisms in the air. A little later, Robert Koch furnished in a most brilliant manner the proof of the specificity of different bacteria and of their etiological significance for the development of infectious diseases. These great discoveries indicated a way for combatting the cause of such diseases on a scientific basis by a specific method of treatment. Further perfection of our methods of examination and differentiation formed the foundation of the present experimental therapy of infectious diseases. In this connection we refer particularly to the preparation of pure cultures of certain pathogenic organisms and also to the fact that it has become possible to call forth corresponding pathological processes in laboratory animals by means of these pure cultures. Our experimental therapy is based chiefly on the important discoveries concerning antibodies by E. von Behring and on the foundation of chemotherapy by Paul Ehrlich.

The possibility to act electively on disease producing organisms and their toxins in the infected body by means of curative substances contained in immune serum, suggested to Paul Ehrlich the ideal to discover and produce synthetically, chemical substances which would sterilize the body after its invasion by microorganisms without damaging the tissues in the same way as specific antibodies act. Thus he created the experimental therapy of infectious diseases, and the Georg Speyer House in Frankfurt a/Main must be considered the original home of this science.

The voluminous investigations of Paul Ehrlich and his collaborators have furnished the proof of the soundness of his conceptions and have shown the possibility of realizing the ideal of a *therapia sterilisans magna* of infectious diseases. Ehrlich's name has gained fame far beyond the boundaries of his native land by his successful work on the chemotherapy of trypanosomiasis and of syphilis by means of aromatic arsenic compounds. Ehrlich found in trypan-red, a polyazo dye, a substance which for the first time effected a sterilization of mice which had been infected with trypanosomes. He then proceeded to study the action of elements related to nitrogen, such as arsenic in its various organic combinations, on protozoal diseases and particularly on the organism of syphilis. Previously Laveran and Mesnil had obtained therapeutic successes with arsenic acid in trypanosomiasis of the mouse. Atoxyl, which had been discovered by Béchamp, was introduced into chemotherapy by Blumenthal, and Uhlenhut was the first to note the lethal effect of this arsenic compound on spirochetes. With the memorable discovery of the constitution of this compound by Ehrlich and Bertheim numerous possibilities opened up for introducing arsenic into the organism in a quite new and active form. The path led from success to success, from atoxyl to arsacetin, to arsenophenylglycin, and, finally, to dioxydiamidoarsenobenzol, salvarsan, a specific the like of which had never before been added to our therapeutic armamentarium, apart from antibodies in sera. Later improvements of this substance, accomplished partly by Ehrlich himself, but more especially by his successor, Kolle, considerably increased the parasiticidal effect and, thus, the curative value of salvarsan. Kolle also introduced silversalvarsan, a typical combination drug in the meaning of Ehrlich's chemoceptor theory. This substance has well established its clinical efficiency.

In the course of his chemotherapeutic researches, carried out on trypanosomes and spirochetes, Ehrlich succeeded in elucidating a number of biological laws, the conception of which form the solid scientific basis and the starting point for all future researches on the subject of infectious diseases. Above all, he showed that the efficiency of any given substance need not necessarily be the same *in vitro* as *in vivo*. On the contrary, some of our most active chemotherapeutic agents, such as arsenobenzol, only develop their full effect in the living organism, while they are practically inert in the test tube. He also furnished the important proof that a substance can only exert a therapeutic effect, if it is held by, and linked up with the cells that are to be acted on, i. e., in the case of infectious diseases, the pathogenic microorganisms in question, Just as in chemistry we have the axiom *corpora non agunt nisi soluta,* so the therapeutic efficiency of substances is determined, according to Ehrlich's results, by the fundamental law *corpora non agunt nisi fixata*. Again and again he found further support for his views on the connection between chemical constitution, distribution, and action in the course of his experiments which have been carried out with innumerable chemical preparations.

Ehrlich was led to formulate his theory of chemoceptors by his work on drug fast and serum fast organisms and the development of and the chemotherapeutic action on a residual base. This theory permits of a uniform biological explanation for the specific nature of the action of chemical substances and for the changes to which microorganisms in the affected tissues are subjected by the action of therapeutic agents and immune bodies. Numerous researchers in all countries have furthered the development of chemotherapy of infectious diseases on the basis of Ehrlich's fundamental discoveries.

Naturally the space at my disposal does not permit of mentioning all the numerous achievements in this department in a few paragraphs; it is even impossible to give a list of all the authors who have specially distinguished themselves. I would only refer in a few words to a preparation produced recently in Germany. Its properties have been studied chiefly by M. Mayer. It is a urea derivative, does not contain arsenic, and is almost free from any poisonous effects. In experimental trypanosomiasis of mice it has proved itself extraordinarily efficacious. Clinical experience will now have to verify, if we have not obtained with this preparation the long searched for specific for sleeping sickness in men and trypanosomiasis in domestic animals.

While the researches referred to so far dealt almost exclusively with the chemotherapy of infections caused by protozoa, I would like now to discuss briefly the therapy of bacterial diseases. Quite contrary to spirochetes and trypanosomes, which are relatively easily affected by widely differing chemical substances, bacteria have proved a rather resistant material for the chemotherapeutist. This really seems paradoxical, for trypanosomes, as well as the closely related spirochetes, are typical protozoa and their cells are much more similar to those of the infected body, a metazoon, while on the other hand bacteria are related to or identical with vegetable cells. One would therefore rather expect it to be less difficult to find means of acting on the cells of bacteria without damaging the tissues of the host at the same time through organotropy, all the more so, since most varieties of bacteria are relatively easily dissolved in the infected body and, in some infections, are cytolyzed regularly. This on the contrary does not generally occur in protozoal infections without the influence of extraneous chemical agents.

A priori, one had to expect that Ehrlich's chemotherapeutic axioms and the fundamental conceptions, which had been developed chiefly in the study of trypanosomes and spirochetes, could not be applied to bacterial infections without modifications. Even in the therapeutic application of chemicals in protozoal infections further points will have to be considered in addition to those cleared up by the study of chemotherapy in trypanosomiasis and spirochetosis. In this connection we may mention the discoveries of Morgenroth concerning the storage of quinine in erythrocytes, which is perhaps the chief cause of the efficiency of this drug as an antimalarial drug. This only shows that no law can be formulated which is applicable in its entirety to all infectious diseases; every infection must be studied independently.

However, in spite of the difficulties opposed to effective chemotherapy of bacterial infections, some notable results have already been obtained in this direction. In the first instance we would refer to the pioneer work of Morgenroth and his coworkers, who have successfully tackled the treatment of pneumococcal infections and of septic wounds with certain quinine derivatives (optochin, vuzin). Kolle later on succeeded in demonstrating that hexaminoarsenobenzol, which is related to salvarsan, is capable of curing experimental swine fever infection which has been produced in mice.

However, the chief interest at present centres around the endeavors of chemotherapeutic action on human tuberculosis. In this connection mention must be made of the work of Countess Linden, Spiess and Feldt, Rondoni and others, and above all the researches of American authors, such as L. M. de Witt and his coworkers Wells, Lewis, Corper, and Sherman, who have attacked the difficult problem in broadly conceived investigations and systematic experiments. Though no specific has so far been produced, the action of which could be considered unfailing, yet some really noticeable results have been obtained. Indeed the hope appears justifiable that for tuberculosis as well as for syphilis effective chemotherapy will be worked out in spite of all inherent difficulties.

This short review of the present state of chemotherapy suffices for sketching in outline the enormous labor which the combined science of the whole world has devoted to the subject of chemotherapy. Further problems of the first magnitude are clearly discernible, and their solution is reserved for the future. The aim of all our endeavors must be to attain a clear insight into biological processes, which form the fundamental basis of every therapeutic attack. This high goal is our common aim and it demands that we put forward all our resources, and it is only by intensive and collective labor that we shall be able to reach it for the benefit of suffering mankind.

Enteroantigens in the Treatment of Noncontagious Chronic Disease

By B. SHERWOOD DUNN, M. D.,

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In 1917 I published an article on the history and clinical results of the treatment of syphilis with luargol, the arsenical compound discovered by Danysz, of the Pasteur Institute, Paris.

This distinguished scientist is now giving to the world a new agent for the treatment of chronic diseases of a noncontagious character, the result of a continued study and experimentation extending over a considerable length of time. This article is a translation of his writings on the subject and a record of clinical results obtained by the author and one of his colleagues in Nice, Dr. Leprince, in the application of this new agent.

The facts reported by Professor Danysz are of the greatest interest. If the results obtained are proved in the general application of his discovery, they show that certain vaccines possess an immunizing as well as a curative action, and that far from being specific are, on the contrary, available for many conditions caused by different microbes and for conditions of which the cause may be unknown.

The results of the work carried out by Danysz throw a brilliant light upon the curative action of the enterovaccine antityphocolic of Lumière, composed of the principal intestinal microbian species, always admirably tolerated, and opens up a new field of investigation of bacteriotherapeutic polyvalent medication.

As a basic principle, if one is to be confident of the correctness of his methods in the treatment of disease, the therapeutics should be based upon a thorough knowledge of the chemical reactions of the system, the nature of the reactions provoked by the malady, and of those induced by the medication.

We can start upon the hypothesis that the normal functions of the body present a physicochemical equilibrium that is practically constant; all pathological manifestations give rise to a chemical reaction that disturbs this normal equilibrium; no matter what therapeutic measure is employed, its choice should be made with the sole object of restoring the functions of the system to their normal condition.

In the great majority of diseases we can judge of the favorable results of the remedial agent chosen only by the clinical results, and although the intimate chemical reactions of living matter within the system, under these conditions, remain to us an impenetrable mystery, recent researches in experimental medicine have brought into evidence conditions in certain cases heretofore regarded as incurable. These researches have been directed more particularly to the reactions provoked by the vaccines (bacteriotherapy), the normal or specific serums, autogenous or heterogenous, the proteins and more recently by certain synthetic combinations, as represented by the arsenobenzines, which have led successively to the discovery of the phenomena of anaphylaxis and of antianaphylaxis preventive, and finally to antianaphylaxis curative. Much controversy has arisen among doctors and experimenters as to the exact definition of the term anaphylaxis, but I think an accord may be reached by defining the condition as a hypersensibility, or rather a pathological sensibility of the organism to the action of a substance, which normally is not noxious, such as a serum, the white of egg, a common form of germ, but which gives rise to certain pathological symptoms, each time it is introduced into the economy by no matter what route, or in what form.

All of the anaphylactics are antigens, because they provoke in the system the formation of specific antibodies and from the physicochemical point of view all of the antigens are formed of the colloids. It has been proved that all the symptoms provoked by the antigens in an anaphylactized animal are uniform, whether it be a serum, an albuminoid substance, a microbian product or one of the arsenobenzines, the injection or ingestion results in gastrointestinal troubles, dermatoses, dyspnea, cardiac disturbances, rheumatic pains, chill, fever, cephalalgia, epileptiform convulsion, and Widal has shown that an exhibition of alimentary anaphylaxis is preceded by the same vasculosanguin troubles as is an attack of asthma.

All these symptoms may appear together, or successively, in the same subject, or separately in different subjects. Violent reactions have been produced in laboratory animals and since the vaccines, serums, and arsenobenzines have come into common use in medicine, it is not uncommon to observe these phenomena where the treatment has been too frequent, or the dose improper. At times these symptoms appear in the human subject following the first injection of an antigen, and can only be accounted for by the supposition that the subject's spontaneous hypersusceptibility has previously been rendered anaphylactic by the same antigen or one of another sort. At all events, we often see produced spontaneously without the intervention of any artificial cause the following pathological manifestations: urticaria, eczema, dyspnea, enteritis, rheumatism, asthma, emphysema, and epilepsy, and it is perfectly natural to seek in this exhibition of spontaneous anaphylaxis the origin of these chronic affections.

Researches respecting the reaction in the system produced by the biological antigens have occupied for the past few years the time and attention of bacteriologists, physiologists, and clinicians alike, notable among whom may be cited Charles Richet, Besredka, Leviditi, Mutermilch, Nicolle, and Widal, in France; Pirquet, Friedberger, Schick, and Kraus in Germany; Vaughan, Jobling, Wheeler, Novy, and Kruyff in America; Eisenberg and Karwacki in Poland; Ascoli and Belfanti in Italy. These researches, as well as the reactions produced by the arsenobenzines, have resulted in placing in evidence the following facts: First, any kind of antigen substance, normally inoffensive, can provoke the symptoms of every known, noncontagious, chronic disease; second, all of the antigens provoke the same set of symptoms. One has therefore the right to conclude that all noncontagious chronic affections of unknown origin are caused by a condition of anaphylaxis. The periodical crises observed in these complaints are produced by the repeated absorption of an antigen of one kind or another.

To verify this hypothesis, which naturally imposes itself as a result of an ensemble of concordant facts, we have only to turn to the precise results that have followed the bacteriological researches into preventive antianaphylaxis.

To hasten the cure in typhoid fever, Wright recommended the injection of the Eberth bacilli; and to cure pneumonia by the injection of the pneumococcus, and most encouraging results have been obtained. Anderson, Rosenau, d'Otto and Besredka have shown by laboratory experiment that an animal, previously rendered anaphylactic, can be protected from a mortal anaphylactic attack by the injection of a nonpathological antigen. Both Wright and Besredka have shown that the preventive or curative antigen must be specific, that is, the same as that producing the malady or the anaphylactic condition.

It follows, therefore, that this method cannot be successfully applied in chronic maladies, the etiology of which is unknown. There are, however, numerous instances where the anaphylactic or antianaphylactic reactions are not exclusively specific. The work of Roger, Josué, de Delezenne, Bosc, de Gley and Lebas (1893-1907) upon the reactions produced by the peptones, the extracts of different organs, and microbian bodies, have shown that the anaphylactic attacks can be prevented by the injection of nonspecific antigens. In 1911, Renaud observed an appreciable curative action following the injection of antityphlitic vaccine in abscesses, peritonitis and osteomyelitis. Weiss treated with success cases of iritis, ophthalmia, blennorrhagia and articular rheumatism, by the injection of cow's milk, Gallois, of Dijon, reports having secured the best results in grippe by the injection of milk. Weill, of Lyon, has employed human milk in the treatment of milk tolerance by nursing women. Injections of one to ten c. c. of boiled milk, in spite of some local reaction, cured dyspepsia, diarrhea, constipation, and certain cases of insomnia and nervous manifestations. Peptone was successfully employed by Pagniez and his collaborators in the preventive treatment of urticaria of alimentary origin, and for migraine. Widal has employed the antigen serums in asthma, urticaria, and the dermatoses. Examples could be multiplied indefinitely of the successful employment of nonspecific antigens.

These favorable results prompted Professor Danysz, of the Pasteur Institute, Paris, to institute a line of experiments to discover if there were not serums, which used singly or in combination might be put into general use as a remedy for the chronic diseases of noncontagious origin. With this object in view, in collaboration with Sabouraud, Cazin, Dalimier, Dominici, Labonnette and Raspail, of Paris, Laporte, of Algeria, and Bernhardt, Sterling and Watraszewski, of Varsovie, he followed out a line of experimental studies, the results of which have appeared at various times.

The results obtained, I will here set forth, in an abridged form, from the various publications cited and with this preliminary statement will dispense with quotation marks.

It was impossible to embrace the entire problem presented. To prove the efficacy of treatment with the peptones, milk and microbian vaccines and compare the results obtained in the different infectious or noncontagious diseases, acute or chronic, it would have been necessary to treat many hundreds of cases by each one of these products and institute for each case a set of observations and series of researches, requiring a long period of time and often difficult to realize clinically. It was therefore necessary for us to limit the field of our investigation to a single group of antigens, and for this purpose we chose that group, which after preliminary trials, seemed calculated to give the best results in a general application to chronic diseases.

Believing that the origin of the chronic diseases of noncontagious character are found in the intestine, caused by the albuminoids, or microbic products obtained in the intestine which find entrance into the blood current through the congested and at times inflamed mucous membrane, which acting as antigens, determine an anaphylactic condition of the organism, we directed our investigations to the result obtained in the treatment of chronic diseases by the injection or ingestion of microbes taken from the intestinal flora.

The bacteriological technic presents no special difficulty. A culture in bouillon is made of the intestinal contents; from this bouillon is isolated on gelose all the cultures produced and in the proportion in which they have been reproduced upon the gelose. A mixture is formed of all the varieties with the aid of a physiological solution, or water sterilized by heat. The quantity of these microbes injected or ingested is governed by weight: one one thousandth to one two hundredth milligrams of microbes for the injections and one to five tenths milligrams for ingestion.

After the examination of the intestinal flora of a great number of patients treated with this vaccine, for various chronic diseases, and also the flora of perfectly healthy individuals, the great uniformity of the microbian products upon gelose caused us to compose a preparation of multivalent vaccines which we used in one half of the cases presented.

In order to appreciate the effect that could be produced by one certain species of microbe, and more particularly in gastrointestinal troubles, we treated a certain number of cases by pure cultures of the enterococcus or staphylococcus of various races of Bacillus coli from the groups subtilis, proteus and perfringens. It appeared to us that the net results obtained from this employment of a single species of microbes were less and also less constant, and the subtilis seemed the least active of any. In cases of tuberculosis we added tuberculin to the multivalent microbic preparation.

Since we commenced our experiments in 1913 we have treated 352 cases, divided as follows: Gastrointestinal: comprising dyspepsias, constipation, enteritis (mucomembranous), chronic appendicitis, and sigmoiditis, urticaria, eczema, psoriasis, scleroderma, asthma, emphysema, rheumatism, dysmenorrhea, leucorrhea, mild chronic albuminuria, disturbances of the menopause, neurasthenia, melancholia, insomnia, migraines, general fatigue, tuberculosis of the skin, mucous membranes, testicles, kidney, glands, and a few cases of the lungs.

In the short space of this paper it would be impossible to detail the treatment applied in each case. Each patient required separate study and particularly as to the dose to be employed. To appreciate the reaction provoked in the organism by the treatment as well as the mechanism of the therapeutic action required recourse to all the means of diagnosis found in medical science; the close study of the emunctories, the arterial pressure, the properties of the physicochemistry of the blood, the functioning of the glands, chiefly of the liver. The studies recently published by Widal and Pagniez and their assistants furnish models of this branch of study. In any event, from the mass of our observations, we can derive some general ideas which may be classified as follows:

1. The injection or ingestion of the enteroantigens is generally well borne and have never provoked any dangerous reaction, if one takes care to commence the treatment by the administration of minimum doses (0.05 to 0.01 c. c. of a solution which contains thirty milligrams to 0.1 of the microbes to 1 c. c.). This dose is never noxious, but may provoke a light local or general reaction, which indicates that the dose should not be increased, except with the exercise of considerable prudence.

2. In all the diseases which we have studied, it is unnecessary to produce any febrile reaction (except in psoriasis) to obtain a cure; but it may be noted that in cases where there is produced a slight reaction, such as that manifested by a slight chill, slight cerebral excitement, or light headache which remains but a short time, never more than an hour, is prognostic of a rapid cure. In cases of psoriasis we find it necessary to produce a perceptible febrile reaction and the more pronounced this reaction the more rapid is the disappearance of the lesions.

3. The injection as well as the ingestion of the enteroantigens invariably stimulates the action of the liver and of the kidneys. The secretion of bile is notably increased, the secretion of urine is sometimes increased to a total of more than a gallon during the first three or four days of the treatment. The hypertension or hypotension of the arteries is often brought to normal, likewise the slow or the rapid pulse. In the neurasthenic, the overworked, and the anemic, the treatment often produces remarkable results. The digestive functions are regulated, with increased appetite and rapid increase in weight.

4. The duration of the amelioration or cure varies greatly. In some of our cases of urticaria and eczema the cure has been maintained for more than four years, without any evidence of return. We have seen cases of psoriasis and of epilepsy, in which there was no return of symptoms for more than a year; cases of asthma and emphysema in which the cure lasted more than three years; cases of tuberculosis, lymphatic, renal and testicular, more than two years; but we also have seen cases of psoriasis, of dysmenorrhea and chiefly of gastrointestinal troucles in which relapse occurred from three to six months after treatment. In these relapsing cases, two or three injections, sometimes a single one, or two ampouls taken in liquid by the mouth have reestablished the cure. Where the relapses persist at intervals, the cure can be maintained by a renewal of the treatment every two or three months.

5. The injection or ingestion of these antigens does not modify the intestinal flora to any appreciable degree, although the malady treated may be completely cured.

6. The time required to effect a cure varies greatly. In nervous disease, the effect is almost immediate. In cases of constipation at times there is a spontaneous movement of the bowels and sometimes a diarrhea of a few hours following the first injection. In other classes of cases the good effects appear only after some weeks following eight to ten injections.

7. In none of the cases studied have we been able to specify the particular microorganism causing the disease. The most we can say is that in some cases of gastritis and acute enteritis, some of the species of Bacillus coli isolated have proved more active than others in the treatment.

8. In cases of psoriasis where the white patches extend to more than fifty per cent. and in cases of epilepsy, we have not been able to secure lasting results, except in infants. In adults the attacks have become more rare and less violent. In all of the other maladies mentioned above, the proportion of cures, or of remissions of greater or less permanence, reach more than ninety per cent. The same preparation has been equally efficacious in asthma, as in rheumatism, dysmenorrhea, eczema, or neurasthenia.

What theoretical or practical conclusions can be drawn from this assembling of facts? Concerning practical conclusions, the most important is that the enteroantigens produce a curative action without any noticeable harmful reaction. This almost absolutely benign, as well as curative action, confers an incontestable superiority to enteroantigens over antigens of peptones, milk and serums employed in similar cases.

From a theoretical point of view it is interesting to note 1, that the curative action of the enteroantigens is not specific; 2, that the action of these microbic preparations is antianaphylactic; 3, that the action is not exercised directly upon the lesions but that the enteroantigens act through the medium of the central nervous system and more particularly through the bulb, causing a stimulating action or correction of the functions of the glands.

As a commentary upon these theoretical deductions we can say that it has been proved that by the ingestion of a massive dose of alcohol or ether prior to the administration of a deadly dose of an anaphylactic we can prevent a fatal result (Roux and Besredka). We also know that an anaphylactic crisis can be produced by sudden fear or grief, both of which showing that depressing or exciting of the central nervous system can provoke or prevent the cellular metabolism, as translated by apparent symptoms.

We also know that sudden cellular reactions can produce an onset of diarrhea, asthma, or urticaria, all of the same character no matter what may be the cause of the crisis; a sudden emotion, an odor, exposure to intense cold, an antigen, which gives us the right to conclude that in the nonspecific reactions there is always a certain reaction of the central nervous system which is the origin of the crisis, as well as its prevention or its cure. The effects, positive, negative, or curative, are seemingly dependent upon a given dose of an active product, and this dose to its affinity more or less elective of the substance employed, for the nervous substance or certain nervous centres. We are led, therefore to believe that of all the known antigens actually in use the enteroantigens exercise the greatest elective action upon the central nervous system.

In another paper I will give details of the practical application of this new discovery with its clinical results.

REFERENCES.

1. Dunn, Sherwood: *Clinical Medicine,* September and October, 1917.

2. Danysz, J.: Origin, Evolution, and Treatment of Noncontagious Chronic Diseases, *Journal of the Academy of Sciences* and *Presse Médicale,* 1918, 1919. *Theory of the Immunity of Anaphylaxis and Antianaphylaxis,* J. B. Ballière & Sons, Paris, 1921.

54 Boulevard Victor-Hugo.

Bacterial Vaccine Therapy

By C. F. KIRKENDALL, M. D.,
Chicago.

The subject of bacterial vaccine therapy or immunotherapy, will be presented from a practical clinical application rather than from the laboratory or theoretical viewpoint. Much has been written and said by laboratory men and theorists that did not correlate with clinical evidence and was only confusing and impractical. I shall therefore eliminate technical terms making this paper extremely plain. My remarks will be confined largely to immunotherapy in acute infectious diseases, namely, pneumonia, typhoid fever, erysipelas, and other similar diseases.

I desire to have you look upon the subject as I have unselfishly looked at it since the first package of diphtheria antitoxin was made in this country which convinced me that I should dedicate my life, as far as possible, to the coming millions of my fellow creatures. I, therefore, have devoted my time to the study and practice of laboratory, clinical, and epidemic work endeavoring to ascertain, in the broadest sense of the word, the most effectual remedies for the cure and prevention of diseases.

I have looked through the eyes of competent clinicians, neglecting no opportunity to learn, prove and apply theories advanced, therefore I am only a borrower, after all; but the picture I shall endeavor to show you is full of proved truths.

The question is often asked by theorists, Why use vaccines in toxic conditions?

Indeed, such inquiries necessitate a comprehensive answer and there exist a great mass of proofs, tangible and verifiable data, clear and conclusive findings, to explain the rational uses of vaccines in acute infections. The most comprehensive reply to such inquiries appeared recently in a medical journal devoted to the discussion of immunotherapy, and analyzing the subject of vaccine therapy in acute infections, says in part:

"Live virulent organisms in an active infection affect body tissues differently than when tissues are brought under the influence of killed organisms in the form of vaccine injections. Live virulent organisms have a destructive tendency on tissues which they invade and this destructive process is carried on by means of the ferments which they secrete from their surface by means of which they digest the food on which they live." In other words: Infecting organisms digest their way into the tissues they invade. Vaughan (1), when referring to a virulent pneumococcus, says: "Virulence may depend on several factors, but rate multiplication is certainly one of them and on a common medium as the animal body this must depend on the effectiveness of the ferments whose functions it is to prepare and utilize the pabulum on which the organism feeds." The growth, virulence and multiplication of infecting organisms is in direct proportion to their digestive capacity. If the organisms possess active digestive capabilities the infection progresses rapidly. In these rapidly progressing infections destructive processes with a fatal termination or a prolonged recovery is the rule. In other words: as a result of the activities of the live virulent organisms from the excessive amount of toxic ferments which they secrete, the tissues that are involved in the infective process are unfavorably influenced. Instead of being an efficient antigen with a stimulating effect on the tissue cells for antibody production, these infecting organisms carry on destructive activities and hinder, retard, cripple, inhibit or destroy the involved tissue cells in their defensive antibody producing capacity, and consequently are not dependable antigens. In this connection it must be remembered that protective substances or antibodies are produced by the tissue cells in the infected area; by the cells that are brought under the direct influence of the infecting organisms. And, furthermore, infections involve certain parts or certain organs of the body. Life is often destroyed not because of the extensive proportion the affection has assumed but because the infection suspends the function of a vital organ, as is the case in a kidney or heart infection. Even in socalled general infections in which the infecting organisms involve the circulating blood, the general tissues of the body are not involved in the infective process. The blood is really confined to the circulatory system and in this instance the circulating organ is infected. By far the greater proportion of the body cells are not attacked by the infecting organisms. So, if the kidneys, for example, are involved in an acute infection and at the same time are called upon to furnish antibody to eliminate the infection, the virulence of the infecting organisms, as a rule, is such that the function of the kidneys is suspended and life destroyed before sufficient antibodies to eliminate the infection can be produced. In other words, virulent organisms are too toxic to influence favorably the involved tissues for rapid antibody production.

On the other hand, these same virulent organisms become nontoxic when injected in the form of a vaccine; because the injected organisms are killed, and because the amount, about 0.0004 of a grain of killed bacteria, is too small to produce toxic effects. Killed germs are deprived of their power of secreting toxic ferments, growing and multiplying; deprived of the very elements which make them dangerous destructive agents in an active infection, they consequently cannot exert the destructive influence that live organisms do. So it will be seen that killed organisms when injected into living tissues in the form of a vaccine cannot carry on destructive processes; but, being intruders, the tissues attack and dispose of them and in this very process of eliminating these injected killed organisms, antibodies for their destruction are produced by the tissues with which they come in contact. The killed injected organisms not being destructively toxic, the cells with which they come in contact are not fatigued or crippled in their defensive capacity, but on the contrary are aroused, stimulated and agitated to the full extent of their defensive capacity with a resulting maximum amount of antibody production. It is just this nontoxic character of killed organisms when brought in contact with body cells that makes them better and more reliable antigens than the live organisms in an active infection, and this holds good whether the vaccine is given as a prophylactic to prevent infection as well as when given as a therapeutic agent to aid the involved tissues in overcoming an existing infection. So, it is apparent that the same organisms that in the body are toxic and without marked antigenic properties really do become nontoxic and actively antigenic when converted into a vaccine.

PNEUMONIA.

We will now take up pneumonia. Only a few years since a great many of our prominent clinicians, including many of the official Army and Navy, would not use mixed vaccines in treating pneumonia. Their attitude was even antagonistic. I find a very different attitude at present.

Immune therapy in acute infections is gaining converts by the thousands; many realizing by their own experience that their most brilliant results are in acute infections, especially pneumonias, and express regret that they have for so long looked through the old glasses. I have been treating, or suggesting, vaccine therapy in pneumonias for ten years and often the remark has been made while working with New York physicians, "Why, Doctor, you go into a case of pneumonia with the same confidence we go to a case of diphtheria." My reply invariably would be, "When you have treated a sufficient number with mixed vaccines, your confidence will be as great as mine."

Lobar and lobular pneumonia, which include the mixed infection, and staphylococcus, the hemolytic streptococcus, the Friedlander bacillus, as well as all pneumonia organisms, indicate mixed vaccines. You do not have time or facilities very often for laboratory findings, and a clinical diagnosis must be your guide. Time is all important; delay is dangerous, as your patient may show a change in a few hours from a pure single culture to a mixed infection. Then why not give a mixed vaccine? You are only adding a few more antigenic substances that will produce defensive antibodies when needed.

In treating, helping to treat, or suggesting treatment in thousands of cases of pneumonia I have seen the mortality decrease to an average of not over one fourth of former records. I, therefore, consider it not only a privilege, but a duty, to ask you to look through the glasses I am looking through when I say to you that your patients are entitled to every chance, to every remedy, you have at your command as long as said remedy will do no harm. You owe it to your patient, to the community, and to yourself. There is no debatable ground.

All the opposition to the early use of vaccines in acute infections is based on theoretical contentions. There is nothing to be found in medical literature which tends to show, from clinical data, that vaccines in acute infections are contraindicated or injurious.

If time permitted, I could give detailed case reports by the hundreds, many corroborated by physicians in Baltimore, to say nothing of my experiences in tabulated cases from other cities. People are often demanding bacterin treatment in acute infections at present.

In conclusion I desire to call your attention to a paper recently read by Dr. Tompkins before the Virginia Medical Society on the treatment of laryngeal diphtheria, socalled membranous croup, in which he cited a number of cases treated by Drs. Ferguson, Wilson, and himself, all of Lynchburg. All of these patients were given large doses of diphtheria antitoxin, one as much as 90,000 units, and a number of intubated patients, all of which were rapidly losing ground, and gave no hope of response when they added to their treatment mixed streptococcic vaccine, saving all the lives where this addition was made to their treatment.

There has been no question in my mind for many years that many of these cases were complicated with streptococcus and pneumococcus organisms. As early as 1913 in greater New York, I treated many patients successfully where they had dispaired of the children's lives, using a mixed vaccine in conjunction with diphtheria antitoxine, both in laryngeal and pharyngeal diphtheria. Occasionally after all the membrane had cleared from the throat, and the only evidence of any infection was a thin white exudate covering the tonsils, or fauces. Tests when taken always showed pathogenic streptococcus or pneumococcus cultures. We often lost those patients when vaccines were not used.

In connection with the throat and air passages and tonsils, I desire to add a word of warning to all physicians regarding the wholesale and indiscriminate removal of tonsils; or, in other words, the massacre of the tonsil, as John N. Mackenzie termed it. We will learn in time the great importance of these glands. They are not lymphatic glands, and do not develop as lymphatic glands, but are now classed with the thymus and thyroid, and undoubtedly some of their functions are the production of leucocytes and ferments that destroy bacteria. Therefore they are the first forts, or protection to the air passages and throat. Ask your throat specialist to evacuate or aspirate the tonsil if filled with pus; treat it locally; wipe out the crypts; give vaccines, and see if you can not save nearly all of your infected tonsils.

I have seen many tonsils saved that I thought were beyond repair. Some were filled with pus; they were aspirated; treated with vaccine with perfect results; others were filled with crypts, swollen until they almost filled the throat, yet all yielded to local treatment with vaccine injections. I fully realize that tonsils beyond repair should come out, but not until you have made every effort to save them.

I marvel when I think of the wonderful age in which we are living. School teachers hold a clinic, look at the children's tonsils and then instruct the pupils to go home and tell their parents that their tonsils must come out. The physician, when he is at a loss to find a focus of infection, jumps to the conclusion that the tonsils are to blame. The mother takes a child to the family physician and insists upon having healthy tonsils removed. A great many physicians agree with the mother in such cases and say that all tonsils should come out, knowing full well that tonsils are comparatively normal. My warning is deduced from the aforesaid irrational, unscientific and thoughtless procedure, call it fad, hysteria, hobby, or what you will.

I have talked with many good throat specialists and they nearly all agree with me that the majority of children have at some time during childhood enlarged tonsils; that children seldom have arthritis even when tonsils are beyond repair; also, that their healthy parents retain their own tonsils. Many throat specialists agree that tonsils should be treated, given vaccine, and if the tonsils clear up and remain clear, let them alone. If they do not clear, or the diseased condition returns, then take them out. I think the final treatment or removal should be by a competent throat specialist, with the admonition from the family physician direct to the specialist to save the tonsils if possible. I deplore the removal of tonsils except by a specialist.

A word in reference to the teeth: Tell your dentist to open pus pockets, treat teeth, while you give patient vaccines and watch results.

I am alarmed for the future of our nation's health when I see the wholesale destruction of the teeth. Physicians not only order their patients' teeth removed, but even attack each other. I would suggest that when you approach the teeth which must be thoroughly examined both clinically and röntgenologically you place a sign warning you to stop, look, listen, and think! Stop long enough to make a thorough examination, look for other centres of infection, listen to the advice of a great many of the best minds of today, as expressed in our medical journals. Think what you have to offer for a toothless mouth—as Dr. James W. Hunter, Jr., has so ably and exhaustively covered in a paper read before the Seaboard Medical Association. I will touch upon only a few points in his address:

"Have we not been over enthusiastic, or again if the extraction of the tooth has resulted in an improvement in one patient does it necessarily follow that the extraction of all the teeth of another will cure him. Is such a procedure ever justifiable? If we suspect pus, we must find it, but we must not expect that the teeth are responsible for all our ills. There are other centres of infection. It will be quite well to study the functions of the teeth; if they had no function, nature would not have provided them. But they have a duty to perform; primarily, their function is for chewing, for masticating, for mixing the food with saliva. If we possessed a gizzard, as in the case of birds, we might pick up sufficient gravel to dispense with them. But such is not the case. If our natural teeth are gone, we must provide ourselves with artificial ones. It must be well noted that nowhere else in the body is there provided a substitute. If we are to preserve the best health, we must foster the art of chewing, but this can only be as long as the teeth remain intact. No matter how clever the dentist may be, he cannot make teeth as good as those that Nature has provided. Most of them are like Tennyson's *Brook*. To paraphrase: they slip, they slide, they bruise, they glide, and this goes on forever.

"We must work in harmony with our dental brothers. McCormick pleads for a standardization of röntgen technic. But it must be observed that McCormick emphasizes the words standardization and accurately made. It is only by good röntgenograms that we can achieve the best results. Such röntgenograms I grant can only be obtained by the expert; but it is only upon expert work that we can rely.

"I think the point well taken that the septic foci be well curetted and drained. Give Nature a chance to act. Likewise I feel that a small abscess upon one root of a molar, while the others remain intact, should be given a chance. The operation of apiectomity must be considered. The same thing may be said of the teeth with but a single root. If any apiectomy offers anything, I see no reason for not attempting it. If the peridental membrane be intact and the gums good, the dentine may be nourished through this means. In other words, the operative possibilities for cure must always be recognized.

"May I repeat my firm conviction that no tooth should be removed until a focus of infection be distinctly demonstrated? May I emphasize my conviction that all areas of sepsis be definitely removed? A conservatism on the one hand; a spirit of radicalism on the other."

In conclusion I would suggest bacterial vaccines as a definite string to your bow, a valuable assistant in all infected conditions of the teeth and gums.

4254 Hazel Avenue.

Anaphylactic Reaction After Blood Transfusion*

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True anaphylactic reactions in man after injections of foreign protein in any form are so uncommon that the following report may be of some clinical interest.

Case.—Mrs. N. F., aged forty-one, para VII, was admitted to the maternity service of the Long Island College Hospital on July 24, 1921, at 5:30 a. m., complaining of abdominal pain and vaginal bleeding. Her last menstruation was in October, 1919, and her pregnancy was uncomplicated. Labor had begun at 2 a. m., and was accompanied by persistent vaginal hemorrhage.

Examination of the patient on admission to the hospital showed a premature separation of placenta at term; there was no fetal heart, the uterus was boardlike on palpation, and there was considerable vaginal bleeding. Cervix eight cm., membranes ruptured; no evidence of placenta prævia. Examination was otherwise negative, except for a mitral regurgitation compensated by a left ventricular hypertrophy.

As the pulse was 105 and the hemoglobin sixty per cent., it was decided to treat the case expectantly. Morphine and pituitrin were administered. The pulse, hemoglobin and blood pressure were carefully watched and the fundus measured every half hour. Patient delivered spontaneously at 7:15 a. m. Placenta delivered spontaneously with a large amount of clotted blood, followed by considerable oozing which was finally controlled without resorting to the pack. Two hours after delivery, the hemoglobin was forty per cent. and it was thought desirable to give a blood transfusion.

The patient's blood was matched against known sera of groups II and III, according to method of Moss. In a similar manner husband and son were tested, and the mother, father, and son were found to belong to group II. The cells of both donors were then tested against the serum of the patient and there was no agglutination by the macroscopic method. At 4:30 p. m., 350 c. c. of blood was withdrawn into a sterile flask containing one per cent. sodium citrate solution, so that the blood citrate mixture contained one third per cent. sodium citrate. The mixture was maintained at body temperature, and after filtration through sterile gauze was slowly injected, by the gravity method, through the right median basilic vein. A salvarsan apparatus and Fordyce needles were used for the injection, which required twenty minutes and was followed by no reaction.

On July 26th, two days after the first transfusion, as the father was unable to appear again, the son was used as donor for the second transfusion, the previous test having shown that there was no hemolysis by mother's serum. A similar amount of blood was withdrawn and administered, the same technic being used as in the first transfusion. The second transfusion was completed at 2:45 p. m., having taken twenty minutes for administration. At the close of the operation the patient's pulse was 100, respiration 20, and her general condition was good. At 4:45 p. m., two hours after the transfusion, the patient broke out in an intense perspiration and felt chilly, complained of weakness and prostration. Her temperature was 100°; pulse 145, small, regular, fair tension; respiration 26.

During the course of an examination the patient had two coughing spells, raising bright red frothy blood, but complained of no pain in the chest. Inspection showed definite cyanosis of the lips; patient gasping for air with an expiratory dyspnea; veins in the neck were distended and the pulsations of the carotids were rapid and forceful. Expansion of the chest was found limited, but equal on both sides with prolongation of the expiratory phase.

Percussion revealed a hyperresonant note throughout; fremitus was normal, and both respiratory sounds were associated with numerous dry, squeaking and musical râles over both lungs anteriorly and posteriorly. Expiration was definitely prolonged. The heart impulse was forceful, 150 to the minute; right border normal; left border, as on admission, fourteen cm. in the fifth space, sounds of fair quality, but because of rapid rate the mitral murmer could not be discerned. Abdomen was negative. Morphine sulphate, one eighth of a grain, was at once administered, and repeated every three hours. Neither adrenalin nor atropine was used. At 5:30 p. m., the perspiration cleared up, the breathing was much easier, rate 26, pulse 126, good quality; râles still present over both lungs. At 7:30 p. m., the general condition was good; pulse 104, respiration 25; no cynaosis, chest findings unchanged. Findings the same at 11 p. m.

Next day, July 27th, at 8 a. m., respiration was 20 a minute, regular, resonance over lungs normal, no râles audible over lungs, no cough, pulse 95, good quality. At 8 p. m., the patient expectorated, after coughing, a small amount of blood stained mucus and several small blood clots. She complained of weakness, but was otherwise in good condition. X ray and fluoroscopic examinations of heart and lungs were negative.

On July 28th, there were no complaints, the patient felt stronger; there was normal vesicular resonance and murmur over the lungs; heart sounds were loud and a mitral murmur was definitely heard again. The patient was discharged August 8th in good condition, with no complaints. Discharge examination was negative, except for left ventricular hypertrophy associated with mitral regurgitation.

COMMENT.

The following definite anaphylactic phenomena were manifested: 1. Reaction after second transfusion. 2. An acute attack of bronchial spasm beginning two hours after the transfusion lasting for sixteen hours (with no history of similar previous attacks or findings of asthma or emphysema on admission). Clinically, the acute bronchial spasm was shown by expiratory dyspnea and increased respiratory rate, lung findings of hyperresonance, and diffuse dry musical râles. The cyanosis, distended veins, and tachycardia were undoubtedly secondary to the impaired pulmonary ventilation. 4. The pulmonary hemorrhage resulting from rupture of a distended capillary.

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Pulmonary embolism can be reasonably ruled out because of: 1. Onset of symptoms two hours after transfusion. 2. Absence of acute pain in chest. 3. The symptoms and physical findings of a bronchial spasm involving the entire lung bed for a period of sixteen hours. 4. Negative x ray and fluoroscopic examinations.

Hemolysis was not the underlying factor of this reaction because: 1. The symptoms first appeared two hours after transfusion. In cases of hemolysis symptoms appear after injection of fifty to a hundred c. c. of blood; the patient complains of ringing and fullness in the head, precordial oppression, and severe backache. None of these symptoms were present in this case. 2. There was no chill associated with the reaction. This finding is constant in cases of hemolysis and appears fifteen minutes to half an hour after transfusion associated with a rise of temperature, generally reaching between 102° and 104°. These phenomena were absent in this case. 3. The symptoms and physical findings of acute bronchial spasm which have never been noted in cases of hemolysis.

CONCLUSIONS.

Despite careful adherence to detail in matching donors for blood transfusion, and careful technic in the collection and injection of blood, unfavorable reactions may occur, attended with danger to the patient. The case of anaphylaxis here reported serves to point out this possibility.

I wish to express my thanks to Dr. John Osborn Polak and Dr. A. C. Beck for permission to report this case from the maternity service of the Long Island College Hospital.

First Aid

Medical Emergent Aid Practically Applied in Industry

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Times change and our methods should change also, not only to keep abreast of industrial improvements but, if possible, to anticipate and be prepared for these advances, in so far as they relate to the health and physical welfare of those industrially employed.

Power machinery and the specialization of human endeavor in industry intensify manual effort, and this speeding up of the human machine requires not only clear heads but alert and active bodies as well. Much of this physical effort becomes automatic, and with automatism indifference and careless disregard of danger are often the sequence, the effect of which spells ill health and not infrequently injuries to the workman. Dangers are increased by power machinery, almost in direct proportion to the extent used and the multiplicity of the parts needed in a modern factory, and to this must be added physical conditions as well as human frailties, which to a large extent, in the vast majority of instances, is the main cause of accidents. It has been stated that less than fifteen per cent. of the accidents are directly attributable to the machine and the balance is credited to the part played by the workman or his associates. This is indeed a severe indictment but since it is the truth, as those who know can faithfully attest, attention must be paid to the supervision of the human part of industry to prevent accidents as well as to care for the injured when accidents do occur.

This, then, being the case is there not sufficient reason for the statement, that medical supervision of industry is essential to efficiency?

Today there exists in the minds of many the idea that first aid consists in relieving those who have been injured or who have suddenly been taken ill while at employment. That removing splinters, bandaging cuts, removing foreign bodies from the eye, relieving stomachaches, restoring the fainting and controlling hemorrhage when it occurs, is the one and only use of the medical and nursing staff. This is far from being the case in our opinion. First aid has a broader and more useful and necessary part to play in its effort to increase efficiency in production. Formerly it was thought that if an establishment hired a doctor to see the injured and patch them up, or make suitable arrangements for prompt ambulance service in case of accident in the plant, sufficient medical service had been provided. Efficient medical service, we believe, means more than mere attendance after something has happened. Industrial medicine can anticipate these happenings and with education and general cooperation may prevent much unnecessary suffering, crippling and wastage of material and can thereby prove an economical factor in expense.

A few years ago a plant was considered large when it covered a great amount of ground, had a few hundred employees, and did several thousand dollars worth of business a week. Today, we have many plants with hundreds of buildings (comparing floor space with floor space), thousands of employees, and work is carried along in periodical shifts throughout the entire day, week in and week out, and the amount of business is reckoned in millions of dollars. In such establishments who is there to do the housekeeping and perform that necessary part of looking out for the members of the industrial family that is performed in the home? Naturally such a task must fall to the physician and the nurse, who are qualified to care for the industrial worker in his place of employment.

The physician, with public health experience and hospital training, is suited to take the lead and if the industrial medical officer is broad visioned and practical he can direct sanitation and hygiene of a plant that will keep the place clean and the workers healthy, and also aid in giving assignments that are suitable to the individual and in adjusting tasks so that the human machine will perform its part with the best results for all concerned. Similarly, the industrial nurse, trained in hospital work, in welfare work, or in public health work, is the most natural chief assistant to the plant medical officer. With the two as captains a plant has a fair chance of maintaining health for its operatives with fewer accidents. In the home, the family which has respect and regard for the work of the father, the mother and the domestic, goes along without jar or disturbance, and so should medical and nursing supervision in the industrial plant move without friction. The work of the doctor and the nurse is naturally in different directions but these interests are so interwoven that demarcation is difficult if not actually impossible. It is indeed a serious question whether a distinction should be drawn. Mutual cooperation between physician and nurse must be cordial, as anything short of this reduces the efficiency of such medical service.

In our experience in medicine as applied to industry, it is impossible to segregate the medical duties of the doctor and the nurse. Since some must serve while others lead, so in order to have discipline we must appreciate that the employer must have employees who are not only suitably coordinated but who can cordially cooperate in the work. I would compare medicine and nursing service to a team of horses—to pull the load properly, the animals must be matched in all respects and work together so that each becomes familiar with the ways of the other and does not "halt and plunge" antagonistically, to the danger of disaster to all. Neither can play the game alone. When the doctor and the nurse cannot get along in peace and harmony and work for the general welfare of all, it is time to make a change and sometimes the removal of both clears the way so that new employees may come in and do that which the old ones failed to perform by reason of their differences. This is first aid and an aid that is more often required than is applied.

The first prerequisite to industrial hygiene is for those directing this service, as well as those performing the practical part to know their work. Industrial hygiene is but imperfectly understood, because it is a comparatively new undertaking. The recent experiences here and abroad during the pressure of work in preparing materials for the war, demonstrated most clearly the necessity for this function. Medicine and nursing did its part nobly in the war, it remains for this service to respond similarly in peace. It can be done and it will be done. First aid naturally requires that such service must be sought and applied. If applied results are certain. As a result of the disturbed relations in industry, now is the time to make this test. Industrial hygiene is but first aid practically applied, in its modern requirements and not, as formerly thought, simply the application of emergency treatment to minor injuries.

What are the functions, then, of industrial hygiene?

1. Prevention of accidents in industrial establishments. Also the prevention of such to industrial workers in the home, in the street, and in all places; in fact, the broad application of the principles of "safety first."

2. Prevention of disease in industrial establishments. These diseases naturally include such as are communicable, the diseases of degeneration, and the special diseases of occupation.

3. Elimination of nuisances, such as the disposal of waste, garbage, fumes, dust and smoke.

4. Maintaining proper heating, lighting, ventilating and cleaning up facilities, such as locker rooms.

5. Providing, preparing and serving suitable and wholesome food, together with the inculcation of regular and proper diet habits.

6. Installing and managing adequate and proper dispensary and hospital service for the sick and injured.

7. Keeping proper statistics of accidents, diseases, absence of employees and the reasons therefor, together with the facts regarding new employment and dismissals, with the making of special reports and suggestion for improvement of the service.

8. Supervision of fire prevention—fire drills, first aid instruction, inspection for safety, teaching the special hazards of the establishment, and the prevention of the dangers of such incidence.

9. Educating workers in personal hygiene and sanitation in the shop, the home, and the community.

10. Research of any special nature to preserve health, prevent accidents, increase efficiency, and improve safety.

11. Clothing; the usual supervision of clothing as a protection against the weather and clothing used as a protection (overall). Special consideration must be given to the suitableness of the clothes, especially shoes, and the selection of eyeglasses either for sight or sight protection.

12. Recreational; special efforts to determine the causes of fatigue and how to determine the presence of weariness; how to anticipate fatigue; how to live and enjoy life; games, rest rooms, physical training; locker room and cleaning up facilities.

To learn all these things requires reading and study. (See list of works in bibliography for special subjects.)

FIRST AID IN THE FACTORY OR SHOP.

The vast majority of minor hurts and injuries can best be treated immediately at the place of occurrence. For this an ambulant case of dressings, medicines and instruments is necessary which should be readily available and every one should be instructed in performing such service to a fellow employee who has met with an accident. Special training is necessary, as workmen intend to do the right thing but are not discriminating. The removing of a cinder from the eye, for instance, is not as simple as it may appear, and these operations should not be performed on the spot. Eyesight is too precious to be tampered with. The removing of a small sliver, applying a bandage to a bruise, or treating a minor scratch, may properly be the work of the lay assistant, and such quick service relieves much unnecessary pain and if treated properly may prevent serious infection later.

Minor hurts become serious through carelessness, neglect, and improper attention. When one runs a splinter of wood into a finger how readily one puts the finger in the mouth, where all kinds of filth may be found, which will infect the little open wound. There are cases where moistening (burns) will relieve pain and also instances where mouth sucking (snake bite) is justifiable, but as a general rule in surgery nothing of this character should be done, as it infects more often than not and makes a serious affair of a very simple and insignificant injury. This lack of knowledge is a constant menace and often is the direct cause of the serious and disabling infection.

Similarly lack of care or improper care may cause eyesight to be damaged or permanently lost. We cannot attach blame where these individuals know no better. Failure to render proper and suitable first aid cripples and renders inefficient skilled workmen who know their jobs but do not know medicine. It is the duty of the first aid officers to see that such individuals are not only instructed but are often checked up and encouraged to reform their practices regarding minor injuries to self or to their fellow worker.

Death is frequently the result of unnecessary infection, occasioning not only a loss to the plant but also depriving the home of its pillar of support and the community of a needed citizen. It is through such neglect that production is reduced in amount and the consequent increase in cost of manufacture necessarily makes prices higher to the consumer. So complex is the part played by the worker in the general economic situation that it is difficult to trace the evil consequences of accidents, many of which are in the preventable class.

ORGANIZATION FOR FIRST AID.

1. Elemental or ambulant service. This consists usually of small first aid packets placed here and there with instructions regarding use, and supervision of workers in order to care for and prevent accidents whenever possible.
2. First aid kit—small service to care for the injured. Where power machinery is employed and there are ten persons engaged the law requires the installing of a first aid kit, but every humane and considerate employer should have facilities for serving the sick or injured worker.
3. The clinic or dispensary. A more extended medical service where workers may call at special hours and receive medical and nursing care. This may be just sufficient to meet the occasional emergency or may be so equipped, as in some establishments, as to be even better supplied than are very many of our public clinics.

It is the practice of many establishments for one to have the services of the doctor and nurse in the morning and another in the afternoon. This gives medical and nursing care and if the two factories are situated close to one another doctor or nurse are quickly available in case of emergency. Again, a group of establishments may combine and have hourly service; in one group of four, two hours are given to each establishment by the doctor and nurse, and the schedule is so coordinated that owing to the small size of the shops and the small number of workers, no more medical and nursing aid is actually required. The plan has worked splendidly and considerable good has been accomplished.

EDUCATION OF THE WORKERS.

First aid is not an instinct, it is an artificial acquirement. Instruction is not difficult and the elementary technic is graphically illustrated and may be applied by any lay person of fair average ability. Every possible form of aid in initiating and perfecting this necessary service in industry may be required. Bulletins, bulletin boards may be posted in places where they can and will be seen. Literature compiled or secured and distributed greatly aids the work and makes the facts more easily retained. Talks, moving pictures and similar visualization of both the need for and the practice of this work helps very materially. Conferences with groups after the usual foreman's conference helps place this information and by constant reiteration it is implanted in the memories of the worker who may be the next one to need such service.

Securing cooperation is the next proposition. Here the chief factor will be in obtaining the appreciation and assistance of not only the management but of all working in the plant. None must be overlooked as no one knows what moment may arise when the lowest may be able to serve the highest or the reverse. Illness makes the whole world akin and no one can feel that he is not interested or concerned. Once a first aid campaign is decided upon, the confidence of the workers in the plant must be secured. It is best to get into close personal relations with every employee. The relief clinic must be operated with so much consideration and humanity that the doctor or the nurse will be so generally and frequently consulted as to bring about a relationship between workers and medical staff of complete good fellowship.

Convention may require rules for discipline and order, yet the enforcement or living up to the spirit of these rules must be gratuitous and done in such common sense manner as to make workers feel free to seek medical help when needed. If there is aloofness or offishness the best of good intentions may be rendered null and void. It is brains and red human blood that counts. This is not the time or place for caste or class.

With confidence and cooperation between doctor and nurse on one side and the workers on the other, the interests of all will be adequately served. There must be inculcated into the mind of every worker in the plant that danger is ever present, that accidents momentarily occur, and the development of care is essential to prevent sickness and accident.

In military establishments first aid is a part of the established military procedure, but in industry this may or may not be the case, and in the large majority of instances it is thought to be voluntary and not an essential part of the undertaking. The injured, not seeking aid unless he personally desires it or is so badly injured that objections are unavailing, does not add to the usefulness of medical or nursing assistance. It is unfortunate that every worker does not appreciate the danger from infection in every injury that breaks the continuity of the skin surface. It is this lack of appreciation of the danger from infection that makes the medical supervision of industrial employment necessary. As has been said time and again, if the minor injury could be immediately placed into position to heal it would do so readily and without any serious consequence, but as long as the injured remove splinters with dirty knives or tools, stick cut fingers into their mouths, or wrap up an abraided surface with a soiled handkerchief or with dirty cloth, infection will continue to follow these accidents.

The purpose of first aid in a plant, therefore, is primarily instruction, and secondarily, alleviating suffering. What are the accidents likely to occur in a given plant? This depends upon the nature of the industry, but it is a proven fact that in every plant some accidents are as certain to occur as the day is to follow the night. Statistics studied from a mass of reports give information with more than reasonable assurance that certain definite accidents will happen, and with this knowledge in our possession, is it but natural that the cautious and prudent should be not only warned but prepared?

In the use of power machinery, we find cuts, bruises, abrasions, and broken bones. In grinding, foreign bodies get into the eye, there are also cuts and bruises, and lung disturbances. In chemical plants we find poisonings, eye injuries, burns, skin diseases and gas asphyxiations. In textile work we have dust hazards, fire hazards, predisposition to tuberculosis, anthrax may be spread from contaminated raw materials, together with the minor injuries noted in the other operations. In fact, in every industry, minor injuries are frequent and many are followed by later infection.

Machinery that is in movement furnishes opportunities for numerous accidents and the mechanic, by reason of his constant association with his machine, becomes automatic in his handling of it and frequently grows careless and this necessarily results in injury to the workman. Again, lack of foresight on the part of workers causes accidents. First aid here is very useful. We would cite the following instances: oiling machinery while it is in motion, climbing on ladders about moving pulleys and shaftings, wearing torn or frayed clothing, shoes out of order, piling materials improperly, not clearing aisles and not keeping passages lighted, placing obstructions in unexpected places, such as the cleaner who leaves her soap and water pail on a turn of the stairs, or the workman leaning his ladder against a door which is likely to be opened, bad lighting about machines, improper shadows about the mechanism causing operators to misjudge distances, and similar procedures.

A most conspicuous fault is the practice of workers smoking in improper places, where combustible materials are used or stored, such as films, celluloid articles, alcohol, turpentine, gasoline, and in the presence of vegetable dusts. This is not only reprehensible but dangerous as well. It is quite common and many lives have been lost as the result of this form of selfishness. There is a proper place to smoke, and for one's own good as well as that of his fellow workers, every one should be willing to obey this necessary rule.

Accidents may be classified as avoidable and unavoidable. Accidents are avoidable when they are under the control of the worker, such as accidents incident to rough house, scuffling, throwing things about recklessly, in fact, general carelessness. Accidents are unavoidable when they are beyond the control of the worker, such as those incident to explosion, short circuiting of electricity, falling of buildings, breaking of cranes, defective machinery, and here we may include physical defects of employees, such as epilepsy, heart disease, defective sight, defective hearing, not understanding signals, working in dangerous places and inexperienced. The avoidable accidents may be controlled by education and suitable discipline. Instruction in the necessity for proper behavior of workers is a prime requisite to the prevention of many accidents. First aid here has its best chance, for there must be instilled into the young and inexperienced the necessity for care and the avoidance of heedlessness, especially in the presence of moving machinery. Many of the unavoidable accidents may be prevented by similar regulation and here first aid must be so broadly applied as to reach these conditions.

First aid instruction and installation must therefore be done so intelligently and humanely as to make all appreciate the danger of accidents and the necessity of keeping them down to the lowest number possible. In one plant fifty accidents happened in a week in a staff of two hundred young women, whereas, after the installation of first aid as here interpreted, these were reduced to less than five. Thus, it is definitely shown that first aid is of service to industry and is something more than simply opening a small office and caring for the injured after they are hurt.

BIBLIOGRAPHY.

1. The New York State Labor Law.*
2. The New York State Industrial Code.*
3. The Sanitary Code, New York City Department of Health.
4. The Ordinances of the City of New York.
5. First Aid: Red Cross, Doty, Boy Scouts, Military Manual.
6. PYLE: *Personal Hygiene.*
7. PARKER: *Hygiene and Sanitation.*
8. NUTT: *Health Officers' Guide.*
9. Safety Fundamentals of the American Safety Institute.
10. WRIGHT: *Industrial Nursing.*
11. COLLINS, E. L.: *Industrial Clinics.*
12. THOMPSON: *Occupational Diseases.*
13. ROSENAU: *Preventive Medicine.*
14. MOCK: *Industrial Medicine and Surgery.*
15. TURNER: *Dental and General Hygiene.*
16. OLIVER: *Diseases of Occupation.*
17. WHITE: *Occupational Affections of the Skin.*

505 PEARL STREET.

Treatment of Tuberculosis by Nasal Insufflation Method

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Phthisotherapy offers few useful preparations for the treatment of tuberculosis, and in tuberculins I believe we have the most specific substance that has so far been discovered. If properly administered, they will do fifty per cent. more good than any other substance of which we have knowledge. Let us review briefly the history of tuberculins. In 1890, Koch (1) announced the discovery of a substance in cultures of tubercle bacilli, which, when administered to tuberculous patients, caused a specific reaction. In 1891, Bujiaid (2) carried out a series of experiments to obtain this substance, which he called tuberculins. Koch later adopted this term for the name of his preparation. The first tuberculin was called old tuberculin and contained the soluble product of the tubercle bacilli in a fifty per cent. glycerine solution. In 1897, Koch discovered another substance which he terms tuberculin ruckstand, a new tuberculin; and later, from his observations on the increased agglutination power of the blood caused by injections of dead tubercle bacilli, was led to the production of bacillus emulsion, a finely pulverized virulent culture of the bacilli to one part of which was added one hundred parts of distilled water and one hundred parts of glycerine.

A few years ago Dr. Owen Paget, working on the hypothesis of the specific action of epithelium against disease, believed that certain epithelia had a specific action against certain diseases; that the epithelium covering the turbinates and lining the paranasal sinuses was capable of destroying microorganisms. By the disintegration of tubercle bacilli they form antibodies. The action of these antibodies is such that it can neutralize the ill effects produced by the tubercle bacilli existing elsewhere in the body. We know that the healing of a tuberculous process depends upon the production of a protecting substance. By stimulation the production of this substance is brought about by the introduction of tuberculin into the body. Paget found that stimulating the nasal mucous membrane by the insufflation method produced the desired result.

Before proceeding, I wish to lay stress upon the importance of nasal breathing. It is highly desirable that the physiological functions of the nose be properly established if in any way hindered. Thus the correction of any nasal deformity is advised. In my limited experience in the field of tuberculosis, I have been impressed by the large percentage of patients, who have been coming under my observation, who suffer from nasal obstruction, inability to breathe through either side of the nose, and of insufficient drainage of the paranasal sinuses.

In my treatment of tuberculosis, I have used the insufflation method, using powdered B. E. tuberculin and endeavoring to carry out as nearly as possible the same technic as that given by Dr. Paget (3). I have treated patients in all stages of phthisis; from the ambulatory cases showing only the earliest signs of the disease, to those in which there is extreme emaciation with cavity formation, laryngeal involvement, and ocular lesions. The treatment is begun by giving one ten thousandth mg. of B. E. tuberculin every other day, the following technic being used for each patient:

A one ten thousandth mg. tablet of tuberculin B. E. is powdered and put into the insufflator, which consists of a glass tube bent to a right angle in the middle, and a rubber bulb. The end of the tube which is passed into the nose is tapered off somewhat to a point. The required dose having been placed in the insufflator, the point of the tube is now inserted into the nostril and held firmly, so that at the moment of insufflation the point of the tube will not be jerked and perhaps cause an abrasion. It is important that the point of the tube be directed up toward the frontal sinus, and not backward. The tube being held in proper position, the nozzle of the rubber bulb is inserted into the funnel end of the tube, the patient instructed to hold his breath, and with a quick pressure on the bulb the powder is blown into the region of the superior turbinate and ethmoids. The patients are cautioned to remain quiet, preferably in bed, and a four hour temperature taken. Careful watch is kept for the development of any unusual symptoms.

This dose is administered six times, providing the patient does not show any marked reaction, that the temperature does not exceed 100°, and that there is no hemoptysis. After six doses of one ten thousandth mg. the dose is increased to one six thousandth mg., given every other day for six days and increased as before, depending upon the reaction. I may add that when there was any marked reaction, such as high temperature or hemoptysis, the dose was immediately decreased or discontinued for a few days, depending on the case.

The usual signs and symptoms observed following the treatment were: Patients frequently complain of slight headache in the region of the frontal sinus, which is due to local irritation and is of short duration. There is slight rise in temperature from a half to one degree, especially when first starting the treatment. The temperature as a rule drops again. Concerning expectoration, one of the first things a patient will tell you is that he is "bringing up" less sputum. The patients complain of being tired, but little importance can be attached to this as most tuberculous patients tire easily, no matter what form of treatment is being used. Improvement in cough was noticed, especially when it was caused by glandular enlargement. No great changes were noticed at first in appetite and weight, but after the first month both improved. Those patients who had pleuritic involvement, at times complained of a slight increase in pain. In ocular tuberculosis wonderful results are obtained, but, as in all local tuberculous lesions, this depends largely on the general resistance of the patient. The nasal mucous membrane after several months' treatment takes on a more healthy appearance.

SUMMARY.

1. It is of the utmost importance that all anomalies of the nose be corrected so that nasal respiration may be correctly established as soon as possible.

2. The insufflation method in the use of tuberculin is of great advantage in the treatment of tuberculosis and can easily be given by any physician.

3. In most cases uniform results are produced. It can be employed in hospital or office alike. The period of treatment should extend over six to eight weeks at least, and where tuberculins are to be used over a long period, it is the ideal method, as it is not painful and causes very little discomfort to the patient, and the results are the same as the subcutaneous method.

In my opinion it is the method *par excellence* for the treatment of ocular tuberculosis.

REFERENCES.

1. Koch: *Deutsche med. Woch.*, 1890, No. 46.
2. Bujiaid: *Gazetta Lekarska*, 1891, No. 4.
3. Paget, Owen: Military Organization and the Treatment of Tuberculous Soldiers, *Medical Record*, vol. lxcv, p. 148, January 25, 1919.
4. *Idem:* The Prevention, Diagnosis, Treatment, Immunity, and Cure of Tuberculosis, *Ibid*, vol. lxciv, p. 754.
5. *Idem:* Epithelial Function in Relation to Disease, *Ibid*, vol. lxxxviii, p. 470, September 18, 1915.

Increasing the Value of the Wassermann Report

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The responsibility for the result recorded in the Wassermann report begins with the physician in charge of the case. The custom in vogue today of obtaining blood at any time of day and with only ordinary precautions as to technic is to be condemned. Furthermore, the method of obtaining two or three specimens of blood at the same time and sending them to different laboratories leads only to confusion when the results differ even in the slightest degree. Since we know that marked daily variations occur in the strength of the complement fixation reaction in the blood of syphilitics, and since we know of a number of other circumstances which cause variations in the complement fixing properties of blood sera, we suggest the following routine:

1. Obtain three specimens of blood on three successive mornings before the patient has had breakfast. If the patient appears to be bilious or jaundiced cleanse the alimentary tract thoroughly before beginning to obtain the specimens. Keep all specimens in the refrigerator and send them to the laboratory properly labeled so that they may be run together on the same day.

2. In primary syphilis, i. e., during the existence of a suspicious primary lesion, if the search for spirochetes is impossible or unsuccessful, have tests of blood made at end of two, four, six and eight weeks after the appearance of the lesion, provided, of course, that each preceding test is negative.

3. The Wassermann report is not necessary in typical cases of secondary syphilis when seen by experienced observers, however, it may be obtained as of confirmatory evidence.

4. In all cases of tertiary, latent, congenital and neurosyphilis obtain three specimens of blood on three successive mornings. Have the three specimens run at the same time. Make a complete examination of cerebrospinal fluid, in addition to blood Wassermann, in suspected cases of neurosyphilis.

5. In latent cases and in cases presenting signs or symptoms suggestive of syphilis, with negative blood, and in old treated cases the provocative Wassermann is of distinct value. Give an average dose of arsphenamine, according to size and weight of patient, in the late afternoon. Obtain a specimen of blood the next morning before the patient has breakfast and continue to obtain specimens each morning for six successive days. Keep all specimens in the refrigerator and send them to the laboratory together so that they may be tested on the same day with the same set of reagents. The method of obtaining only one specimen after a dose of arsphenamine for a provocative test is of little value. Some cases become positive only after a considerable amount of treatment.

6. Needles and glassware should be clean, sterile and dry. No antiseptics should be used on needles or glassware. Old blood, hemolyzed blood, and specimens of blood containing foreign substances are unfit for use.

7. Give data in reference to all specimens, e. g., "suspicious primary lesion," "for diagnosis, history, signs and symptoms negative," "husband has syphilis, specimen from wife who shows —— (or no) signs," "congenital (or latent) syphilis suspected," etc.

8. To determine a cure after adequate treatment: 1. Patients in whom the diagnosis was made by the demonstration of spirochetes in the initial lesion and in whose cases the blood has never been positive should show negative tests of blood at intervals of three months for two years after all treatment has been completed. 2. All other cases of syphilis should show negative tests on blood at intervals of three months for at least two years after an adequate course of treatment has been completed, a negative provocative test and also a negative spinal fluid.

It is only by cooperation and constructive criticism that progress is made in medicine. Absence of these between the clinician and the laboratory leads away from achievement.

Healey Building.

Editorial Articles

THE ANTENATAL TREATMENT OF CONGENITAL SYPHILIS.

Various means are proposed for staying the ravages of syphilis, including the congenital forms of the disease. The means of attack are mainly the same as with the acquired variety, that is, by mercury and arsenic. Congenital syphilis is much more frequent than it is generally supposed to be, and with the increase of acquired syphilis the congenital form has increased *pari passu.*

At a meeting of the Royal Medico-Chirurgical Society of Glasgow, held on October 7th last, the question of the treatment of congenital syphilis was dealt with at some length. Dr. G. B. Fleming read a paper on the postnatal treatment, stating that the figures collected between 1917 and 1920 seemed to show that intravenous injection of salvarsan reinforced by mercury was the best postnatal way of treating congenital syphilis; that the younger the patient the greater the probability of cure; and that a case should be pronounced cured only when the Wassermann reaction had been proved to remain negative.

Miss Ethel Crawford, M. B., read a paper on sulpharsenol in the treatment of congenital syphilis, in which it was shown that the results of using this drug by intramuscular injections at the Royal Hospital for Sick Children, Glasgow, suggested that it was not so efficacious in producing a cure of congenital syphilis, as evidenced by the Wassermann reaction, as intravenous injections of kharsivan. While the postnatal treatment of congenital syphilis may be and often is successful, as demonstrated by a negative Wassermann reaction, it is argued by many that postnatal treatment is too late. Dr. J. R. C. Greenlees upheld this view. He pointed out that the focus of the infecting spirochetes was probably the placental tissue, and therefore treatment should aim at prevention of their development there and their spread to the fetus. Dr. Greenlees quoted statistics to show that antenatal treatment with mercury and iodide of potassium had not been very successful. On the other hand, fifteen cases treated in the Royal Hospital for Sick Children, Glasgow, where antenatal treatment was carried out with arsenical compounds and mercury, all showed successful results, some of these cases being followed up for as long as seven years.

Dr. Leonard Findlay insisted that the foregoing communications showed that antenatal treatment was the treatment *par excellence.* Prophylaxis was beyond question better than curative treatment. The ease of the antenatal method of treatment and the avoidance of the pain and misery many young syphilitics underwent in the course of the curative treatment were striking recommendations in its favor. Findlay did not hold with the statements recently made to the effect that congenital syphilis was becoming less severe in its manifestations. He strongly advocated the application of the antenatal method of treatment by the general practitioner, and gave his opinion that with the Wassermann test available and administration of the new salvarsan preparations easy there was no necessity for the special venereal clinic nor for the socalled venereal specialist in the case of syphilis. Finally, he laid great stress on the desirability of making syphilis a notifiable disease with particular regard to its influence on infantile mortality.

As said before, congenital syphilis is fairly common, and its successful treatment is patently of the utmost importance. If it is absolutely correct that antenatal treatment produces the satisfactory results Greenlees and Findlay declare that it does, then it should be carried out whenever possible.

MUSCULAR CONTRACTION IN MIDGASTRIC BILOCULATION OF THE STOMACH.

Radioscopic studies of the stomach have revealed the unsuspected existence of bilocular stomach in many instances, but in some cases the operation resorted to on account of the indications furnished by the x rays has not verified the presence of an anatomical biloculation. Besides, in almost all cases in which a stenosis was effectively found at operation, it was less restricted than radioscopy indicated. Only an intermittent or prolonged muscular action—a contracture of the middle tunic of the stomach—could produce similar phenomena which at present are interpreted as temporary or prolonged spasms of the gastric muscle. The part played by this spasm in the formation of organic biloculation merits discussion.

At the present time it is proved by numerous observations that midgastric spasm may remain identical to itself and can be verified by radiographs taken in series during months or even years, as shown by Leriche, Cotte, Richard and Montier. Groedel, Levi, and Barjon have shown that in cases where the spasm was intermittent it invariably occurred at the same spot. Finally, operative findings have almost always shown that in the cases in question, if the biloculation had disappeared under the influence of the anesthetic, as it occasionally disappears on the screen after belladonna has been given, one will always find a causal lesion on the lesser curvature or on one of the gastric surfaces represented by an ulcer in evolution or in exceptional cases, a cicatrix. Rilder, Nathanblutt, de Quervain, Beclère and Stierlin, who were the first to bring out this fact, drew interesting diagnostic inferences and pathogenic conceptions, showing the relations existing between the muscular contracture and the nervous irritation resulting from the lesion in evolution.

In point of fact, the pneumogastric is the motor nerve of the stomach, as shown by the physiologists, while clinically the spasmophilic action of its irritation has been shown by Neyrovsky, Paltauf and Krauss for both the cardia and the pylorus. Loeper and Schulmann have insisted upon the histological lesions of the nerves as supplying the lesser curvature encountered in sections of chronic ulcer and representing, in a way, the anatomical substratum of the origin of the spasmodic phenomena.

Before the use of the x rays the part played by muscular action in the pathogenesis of biloculation was already known and the question arose as to whether or not this temporary contracture could favor the development of organic stenosis. Beclère and Mériel admitted this possibility as far back as 1912, while still more recent data obtained by other observers seem to justify this opinion. If in many cases similar to the two recorded by Leriche and Cotte, no change in the gastric walls could be detected at operation at the spot ordinarily the site of the contracture and after this had disappeared, this was not always the case. Caillé records a case of Ricard in which, although the spasm had disappeared, at operation a difference in the thickness of the gastric muscle between the pyloric and cardiac regions was distinctly evident in favor of the upper portion showing that there already was a difference in the gastric walls above and below the inorganic stenosis. In one case of midgastric resection, Israel found an annular hypertrophy of the gastric muscle ending in organic stenosis.

Two histological examinations, reported by Santy relating to the segment of the stenosed ring, also show changes in the muscle corresponding to the furrow of the biloculation. Whether it be admitted, as Delagenière does, that the inflammation resulting from the ulcer may in the long run fix the spasmodic contracture permanently by the development, first of young connective tissue and later on of fibrous tissue, or as Strauss and Brandenstein say that the process is one of hypertrophy, it would nevertheless seem that such a mechanism must be the exception, in so far as an isolated phenomenon is concerned capable of producing a stenosis similar to the one operated on by Israel. It should be frequently associated with the part played by the ulcer in activity and complete the very important action of the ulcer itself and the inflammatory tissue surrounding it. The spasm, if it results from the organic stenosis or if it is incapable by itself of realizing an anatomical lesion, certainly facilitates the slow formation. A superadded phenomenon, to the true stenosis from ulcer it contributes undoubtedly in a large measure to the intensity of the functional disturbances it brings about.

PUBLIC HEALTH PROGRESS IN ONTARIO

During the past ten years, according to Dr. John W. S. McCullough, Chief Officer of Health for Ontario, the advances in public health have been noteworthy in that province. In 1912 the Public Health act was consolidated and district officers of health were appointed, the province being divided into some eight or ten districts. While county officers of health were looked for, the creation of the district officers of health was considered a step far in advance. Full time men, of course, had been for a number of years established in several of the larger cities; and each municipality had medical officers of health in the townships, but their salaries were as meagre as their duties were restricted. These township medical officers began to be paid more adequate salaries for their services, and by the law then enacted a certain amount of tenure of service began to prevail.

Particularly striking has been the work carried on in connection with the campaign to eradicate tuberculosis. Dr. Roberts, M. O. H. Hamilton, recently stated that whereas in 1898 one in every eight deaths was from tuberculosis, in 1920 the rate was one in every thirty. Again, in Hamilton, Ontario, in 1896, seventy persons died from tuberculosis when the population was 59,000, but in 1920 there were only forty-six deaths from tuberculosis when the population stood at 115,000. The Canadian Association for the Prevention of Tuberculosis took an active hand in the campaign, mostly of an educational character, to reduce tuberculosis. In Ontario the Government now provides an amount up to $4,000 toward the cost of building sanatoria in each municipality or group of municipalities. It further donates the sum of $3.50 weekly toward the cost of maintenance of each patient. As a result of this policy the annual grants for maintenance of those institutions have advanced from twenty-six thousand dollars in 1910 to two hundred and seventy-nine thousand dollars in 1919. Ten years ago there was accommodation in sanatoria for 615 patients, while at the present time there is room for about 2,000. The Federal Government grants an annual sum of $10,000 to the Canadian Association for the Prevention of Tuberculosis, but while the prevention of tuberculosis is a national question, practically all the cost of the effort in tuberculosis has been borne by the provinces. The Ontario Board of Health has been particularly active in educational propaganda, and for this purpose a sum of nine thousand dollars is in hand.

One of the most important activities of Ontario in public health work has been the manufacture and distribution of biological products. Not only in diphtheria antitoxin, but in tetanus antitoxin, typhoid, pertussis, and smallpox vaccines, antimeningitis serum, preventive treatment of rabies, and gonorrheal ophthalmia, biological products have been supplied free to physicians and boards of health. One great activity of the Ontario Board of Health was the supplying free of cost to the Canadian Army during the war the entire quantity of typhoid and partyphoid vaccine used. In laboratories the province is now well provided for. In 1910 there were two such laboratories, which by the end of a few months will be increased to seven.

A well organized campaign is now proceeding against the prevalence and spread of the venereal diseases throughout that province. Clinics have been established in the larger cities. There are six such clinics in Toronto; one each in Kingston, London, Hamilton, and soon others are to be established in Ottawa, Fort William, Brantford, and Sault Ste. Marie, as well as Windsor. Two thousand dollars has been donated for these clinics, five hundred dollars of which will be set aside for the payment of a social worker, and five hundred dollars as honorarium for the specialist in charge. For this work throughout the province the Ontario Board of Health has secured a grant of fifty seven thousand dollars from the Dominion Government, and the Ontario Government will place at the disposal of the Board of Health an additional grant which will bring the total sum up to one hundred and fifteen thousand dollars annually for handling this work.

Ontario being the home of many industries the Province has begun work in industrial hygiene. There are other activities in maternal and child welfare. To show succinctly what is being done in public health in that province: whereas in 1910 the appropriations for public health under the Board of Health amounted to fifty thousand dollars, for the present year these appropriations exceed those of all the provinces of Canada put together, and total the sum of five hundred thousand dollars. This is exclusive of the expenditures in the large cities—Toronto alone approximating one half that sum.

THE PATHOGENESIS OF INFECTIOUS EDEMA OF THE LUNGS.

The pathogenesis of infectious pulmonary edema need not be considered at great length. One point alone is of great interest, and that is, the relationship between the infectious and the mechanical edemas of the lungs. Clinical experience attests to two facts: First, the unquestioned existence of infectious edema of the lungs manifesting itself and going through a process of evolution in the absence of any adjuvant cause, mechanical or dyscrasic, and especially a renal or cardiac lesion; second, the remarkable frequency with which infectious edema, especially the acute form, occurs in subjects in whom the kidneys or the cardiovascular system is already pathologically damaged, for instance, in Bright's disease, hypertensive states, cardiac lesions, aortitis.

The question of the relationship between these two classes of edema is all the more difficult to solve because in reality, in order to produce the edema, the infection can bring into play a pathogenic mechanism analogous to that which governs the production of dyscrasic edema. To explain the edematous processes in Bright's disease, particularly the acute processes, the action of certain glandular disturbances is admitted. The most important is that so frequently observed in the suprarenal capsules, which result in the overproduction of adrenalin and high blood pressure. It is likewise admitted that the most varied types of infection may react on the parenchyma of the suprarenals and produce a functional excitement of the cells secreting adrenalin, or, at all events, of certain anatomical elements susceptible of manufacturing substances endowed with hypertensive and hydropigenous properties. It would be interesting to undertake researches for the purpose of ascertaining whether the blood of patients with edema, especially infectious pulmonary edema, contained adrenalin, which, in this conception, should be the chemical substratum of hypertensive accidents, even as urea seems to be the substratum of the accidents of azotemia. Work carried out in this direction by Logre resulted in negative findings.

Finally, it is admitted that the edema of Bright's disease is related more particularly to chloride retention. The edema is, therefore, a direct result of the regulating mechanism which maintains a constant percentage of the salt contained in blood serum. The salt is thrown into the connective tissue and then it draws to it the necessary quantity of water for dissolution by virtue of the well known laws governing the osmotic tension of saline solutions.

It is to be noted, however, that chloride retention is not only due to renal insufficiency, but may be met with during the evolution of the majority of infectious processes, especially the acute infections, and among the latter there is one which more than all others is a cause of massive chloride retention, namely, pneumococcal infection. Now if there exists a pathogenic paradox, it is certainly not the manifestation of a pneumococcal hydropigenous infection; the paradox in the present state of our knowledge is the chloride retention of pneumonia patients who sometimes accumulate enormous quantities of sodium chloride in their tissues, as the discharge of chlorides testifies, without, however, presenting distinctly appreciable signs of either visceral or peripheral edema. It is natural that the pneumococcus, the primordial factor of chlorinemia, must at the same time be *par excellence* the hydropigenous bacterium. What remains to be explained is the dry retention in classical fibrinous pneumonia, which may be elucidated by further researches.

KNIGHT DUNLAP'S PAPER.

We are fortunate in being able to present to our readers in this issue of the New York Medical Journal, a paper from Professor Knight Dunlap. Professor Dunlap occupies a high position in the field of experimental psychology. He is always sincere. Unfortunately, the present paper is not as convincing as it might be. This is readily understood when we see that he is attempting to ride two horses at one and the same time, giving the impression that after all they are one and the same horse. The result is confusion, so great that it doubtless includes his own thinking.

The first part of the paper, if we may take the liberty of dividing it for the sake of clarity, is easily disposed of, if a bit of consideration is given to the animistic phase of development which is found both in infants and savages—the infants of the race. Had Dunlap considered this he would have been saved from making his homely, roundabout examples, doubtless the result of much laborious thought.

The second part of the paper is devoted to an attempt to discredit modern psychologists in their work on the unconscious. He asserts that he is doing this through laboratory methods and that he is going to do much more in the future. To help him in this worthy task we would suggest that he consider some of the points which he has overlooked. As far as he has gone with his yardstick methods he has given valuable suggestions. The difficulty is that he has not gone very far. To attack, one must first understand. He has failed to consider the development of the sexuality of man. He has not gone into the autoerotic, narcissistic, homosexual, and heterosexual stages through which all must pass in the evolutional course of sexual development. Perhaps he does not know that these stages occur. But how would he be expected to know these from a laboratory, even a well equipped laboratory. These things must be learned from life, from the study of the human psyche. If Dunlap should continue his studies without considering these few important details it would make all of his work invalid. And it would never do to have him work out a beautiful theory, in an attempt to discredit the unconscious, and then have his results meaningless due to a mere oversight of the fundamentals involved.

There are a few other points which it will be necessary for him to consider before his results will have any value. Test tubes and psychological laboratories are valuable as aids in physiology. The great trouble is that frequently, in their enthusiasm and blindness to essential psychology, laboratory workers feel that they are justified in making the slight typographical change from physiology to psychology. They deal with physiological material and carelessly call it psychology. Of course this causes no harm among those who are conversant with the meanings of these two similar, yet somewhat different terms. However, it is not too late for Dunlap to investigate the subject more carefully and so bring a clearer understanding of what so far he has handled in a somewhat chaotic manner.

MALNUTRITION AND OVERWORK.

We have been hearing much of the deteriorating effects of malnutrition and overwork on the health of people in the war torn countries of Europe, but here is a study of the effect of war in relation to child labor—the latter always a problem. A summary of two German reports on this matter appears in the July issue of the *Monthly Labor Review*. During the war thousands of children of both sexes were engaged in overtime, night and Sunday work, combined with underfeeding as the cost of living shot up. As early as 1916 there was agitation in Germany for the repeal of the war emergency law of August 4, 1914, under which this amount of child labor was permitted.

In the district of Hanover, according to the summary, "an increase in the frequency of diseases due to cold and exposure was observed during the war; the duration of these diseases also became longer, and the cases as a rule were more serious than in peace time. . . . The lack of fats in the diet also aggravated this condition in a number of cases. In addition, the factories, overcrowded with machines and workers, made greater demands on their power of resistance." In the district of Hildesheim, it is stated that the young workers "frequently had to perform hard physical work beyond their strength. Undoubtedly their health was also affected by the overtime work which was especially frequent in the first years of the war, in most cases without authorization. As the war went on overtime decreased, but in the evening and night work there arose new causes of injury to the health of the workers, especially young persons." In Cologne, children under sixteen were engaged in night work which, according to the inspector, "could not be carried on over an extended period without injury to their health." According to the head of the lower Bavaria inspection district: "The long duration of the war, the constantly deteriorating food conditions, and the frequent overtime, night and Sunday work, affected particularly unfavorably the growing children, numbers of whom were obviously retarded in their physical development."

Summarizing, according to the *Review,* it may be said "nearly all the factory inspectors agree that the war period had a serious effect on the health and physical efficiency of the workers, although it is difficult to express this effect in figures. . . . With the third year of the war their physical efficiency began to decrease constantly, and exhaustion and the effects of underfeeding became more apparent, in spite of factory kitchens, arrangements by the employers for supplying food, and large increases in wages."

Doubtless similar effects were observed in all the warring nations where children had to play a large part in keeping production going at home. The *Review's* summary is based on articles in the *Bulletin des Internationalen Arbeitsamtes,* and the *Jahresberichte der Gewerbeaufsichtsbeamten und Bergbehörden für die Jahre 1914-1918.*

THE BEGINNINGS OF DISEASE.

The foundation of the Institute for Clinical Research, at St. Andrews, Scotland, by that admirable teacher of clinical medicine, Sir James Mackenzie, marks an important epoch in medicine. Here at last is a visible and concrete evidence of the realization of the importance of the beginnings of disease. In his first annual report as provost of that institution, Sir James pointed out the regrettable fact that the out patient departments of the hospitals, the place where the beginnings of disease are first seen, are in the hands of the youngest and least experienced members of the staff, whereas, here above all other places skill and experience in diagnosis are of the greatest importance, for it is at the beginning of his trouble that the patient can be given the greatest aid. A similar note was struck by Dr. David Drummond in his presidential address before the British Medical Association, in which he said (*Lancet,* July 23, 1921): "The diagnosis of incipient disease is at once the most difficult and the most important problem the doctor has to face, and yet, it must be admitted that hitherto but little attention has been given to this phase of clinical medicine." Here then is the field which will bring the richest rewards in knowledge and in help for suffering humanity. Let us study more closely the beginnings of disease.

News Items.

Journal of Orthopedic Surgery Changes Name.—The *Journal of Orthopedic Surgery,* which is published in Boston, announces that hereafter it will appear as a quarterly publication under the name of *The Journal of Bone and Joint Surgery.*

A Memorial Scholarship in Medicine for Women.—A medical scholarship for women is to be established in the University of California, in memory of Dr. Sarah Shuey, of the class of 1876. Dr. Shuey was the first woman who graduated in medicine from the university.

Public Health Institute in Chicago.—Arrangements have been completed by the Illinois State Department of Health for a Public Health Institute to be held in Chicago in March. Programs have been prepared and may be had upon request from the Health Commissioner in Springfield.

Expedition to Study Sleeping Sickness.—It is said that Great Britain is planning to send an expedition into Africa to study sleeping sickness. It will be in charge of Dr. Marshall and Dr. Vassalo, of the Uganda Public Health Service, with two assistant physicians and two veterinarians.

Typhoid Epidemic Suits.—The first of a series of suits against the Gould Manufacturing Company and the Seneca Water Company, growing out of the recent typhoid epidemic at Seneca Falls, N. Y., is scheduled for January 16th in the Supreme Court, Rochester.

Harvey Lecture.—Dr. George H. Whipple, dean of the University of Rochester Medical School, will deliver the fourth Harvey Society lecture at the New York Academy of Medicine, Saturday evening, January 7th, his subject being Pigment Metabolism and Regeneration of Hemoglobin in the Body.

Addition to New Rochelle Hospital.—Two hundred and fifty thousand dollars has been collected for the erection of a wing to the New Rochelle Hospital, which will contain sixty beds. Last year this hospital cared for 2,196 patients and gave clinical service to three thousand.

Health Department Prohibits Sale of Horsehair Shaving Brushes.—The public health council of the New York State Department of Health has passed a regulation prohibiting the manufacture, the sale or the offering for sale, in the state of New York, of shaving brushes made from horsehair, as it has been found that anthrax may be contracted through the use of such brushes. The regulation became effective on January 1st.

Personal.—Mr. Curtis E. Lakeman has been appointed secretary of the New York State Department of Health, to succeed Dr. John A. Smith.

Dr. Herman M. Biggs, commissioner of Health of the State of New York, was reelected president of the American Social Hygiene Association at its eighth annual meeting.

Dr. L. Emmet Holt, of New York, delivered the three Lane lectures at the University of California, on December 5th, 8th and 9th, his subjects being Growth and Nutrition, the Vitamines, and Practical Problems in Improving the Nutrition of Children.

Fellowship in Surgery at Lebanon Hospital.—A surgical fellowship, amounting to six hundred dollars, has been provided by Dr. Abraham J. Rongy, at the Lebanon Hospital, New York. This fellowship is awarded annually to the graduate house surgeon, who, in the opinion of the medical board, has had the best record during the entire term.

New Hospitals for Disabled War Veterans.—The United States Public Health Service will establish during the year 1922, six new hospitals for the use of disabled war veterans. There will be three tuberculosis hospitals, with a total capacity of 920 beds, and a general hospital at Fort Walla Walla, Wash., with a capacity of 1,240 beds. The new neuropsychiatric hospital in New York with one thousand beds will also be ready for use next year.

New York Society of Industrial Medicine.—Dr. T. G. Smith, of Schenectady, N. Y., was elected president of the New York State Society of Industrial Medicine at its first annual meeting held in Syracuse last month, and other officers were elected as follows: Dr. C. H. Weston, of New York, first vice-president; Dr. Ralph W. Chaffee, of Syracuse, second vice-president; Dr. Myer S. Bloom, of Binghamton, secretary; Dr. S. M. Slater, of Rochester, treasurer.

Reconstruction Assistants Wanted by the Public Health Service.—The United States Civil Service Commission announces that applications will be received for reconstruction assistants and aides in physiotherapy and occupational therapy, physicians, and trained nurses, to serve in hospitals and other establishments of the United States Public Health Service and the Veterans' Bureau, in the care and rehabilitation of men injured in the world war. Full information and application blanks may be obtained from the commission.

To Reorganize United States Public Health Service.—A bill has been introduced in the Congress providing for the reorganization of the United States Public Health Service. By the terms of this bill, officers of the reserve corps of the Public Health Service, not to exceed 550, may be transferred to and commissioned in the regular corps of the service. The office of Surgeon General shall be filled by appointment by the President for a term of four years. The bill also provides that there shall be in the United States Public Health Service a corps of nurses, dietitians, and reconstruction aides.

International Sanitary Congress.—At the recent International Sanitary Congress, held in Paris, the suggestion of the United States Public Health Service was adopted, that plague, yellow fever, and cholera, be included among the international notifiable diseases. It was also decided that smallpox and influenza epidemics should be a matter of diplomatic notification whenever they occurred in the various countries. This Congress, which represents more than forty nations, will hold another meeting next June, when diplomatic representatives of practically all nations of the world will meet to discuss the work of the sanitary officers. At the Paris meeting, the United States was represented by Assistant Surgeon General Rupert Blue, United States Public Health Service, Washington, D. C.

Missouri Valley Medical Society.—At the recent annual meeting of this society held in Kansas City in conjunction with the Medical Society of the Southwest, the following officers were elected: Dr. Paul E. Gardner, of New Hampton, Ia., president; Dr. Henry J. Lehnhoff, of Lincoln, Neb., first vice-president; Dr. Austin McMichael, of Rockport, Mo., second vice-president; Dr. Oliver C. Gebhart, of St. Joseph, Mo., treasurer; Dr. Charles Wood Fassett, of Kansas City, Mo., re-elected secretary. The next meeting of the society will be held in St. Joseph, Mo., September, 1922.

Died.

Baner.—In New York, on Friday, December 9th, Dr. William Llewellyn Baner, aged sixty years.

Boone.—In Bellaire, Ohio, on Tuesday, December 6th, Dr. Dexter W. Boone, aged sixty-three years.

Broyles.—In Johnson City, Tenn., on Monday, November 28th, Dr. Charles Joseph Broyles, aged fifty-nine years .

Carr.—In Cincinnati, Ohio, on Sunday, December 4th, Dr. Lawrence C. Carr, aged sixty-six years.

Cox.—In Lee Center, N. Y., on Friday, December 2nd, Dr. Truman H. Cox, aged sixty-eight years.

Craig.—In Brooklyn, N. Y., on Tuesday, December 13th, Dr. Thomas Canby Craig, U. S. N., aged sixy-eight years.

Farrington.—In Manchester, N. H., on Saturday, December 10th, Dr. Morton Farrington, aged forty-nine years.

Foreman.—In Tacoma, Wash., on Thursday, December 1st, Dr. Absolom L. Foreman, aged eighty-four years.

Glasscock.—In Evansville, Ind., on Monday, November 28th, Dr. George W. Glasscock, of Raleigh, Ill., aged sixty-nine years.

Glickstein.—In Brooklyn, N. Y., on Saturday, December 10th, Dr. Abraham L. Glickstein, aged forty-eight years.

Hancock.—In Philadelphia, Pa., on Tuesday, December 6th, Dr. Eugene T. Hancock, aged fifty-two years.

Harmount.—In Pittsburgh, Pa., on Thursday, December 8th, Dr. William Card Harmount, aged thirty-eight years.

Herrington.—In Morse, Sask., on Tuesday, November 22nd, Dr. Grover Harrington.

Holley.—In Hamlin, W. Va., on Wednesday, November 30th, Dr. Elisha Holley, aged seventy years.

Hollingshead.—In Trenton, N. J., on Saturday, December 10th, Dr. Emily F. Hollingshead.

Hutchinson—In Portland, Me., on Monday, December 5th, Dr. Charles Hutchinson, aged ninety years.

Kerr.—In Chattanooga, Tenn., on Tuesday, December 6th, Dr. Edward E. Kerr.

Larkin.—In Philadelphia, Pa., on Sunday, December 11th, Dr. Thomas Leo Larkin, aged forty-five years.

MacFarlan.—In Philadelphia, Pa., on Thursday, December 8th, Dr. Malcolm MacFarlan, aged eighty years.

McCrimmon.—In Butte, Mont., on Wednesday, November 30th, Dr. Frederick W. McCrimmon, aged fifty years.

Morris.—In Rome, N. Y., on Tuesday, December 6th, Dr. Robert Morris, aged fifty-three years.

Pohl.—In Buffalo, N. Y., on Monday, December 5th, Dr. Gustav A. Pohn, aged sixty-seven years.

Sater.—In Hamilton, Ohio, on Thursday, December 1st, Dr. Pearl M. Sater, aged fifty-two years.

Sauer.—In La Crosse, Wis., on Monday, December 5th, Dr. Anton Sauer, aged fifty-six years.

Scovel.—In Yonkers, N. Y., on Saturday, December 10th, Dr. Ashley Scovel, aged fifty-nine years.

Shelton.—In Chillicothe, Ohio, on Monday, December 5th, Dr. James Cowper Shelton, aged fifty-eight years.

Sizer.—In Cosmopolis, Wash., on Saturday, November 26th, Dr. Edmond A. Sizer, aged fifty years.

Smith.—In San Mateo, Cal., on Thursday, November 17th, Dr. George Sidney Smith

Tibbles.—On Saturday, November 26th, Dr. John W. Tibbles, aged seventy-one years.

Torrey.—In Olean, N. Y., on Wednesday, December 7th, Dr. Edward Torrey, aged seventy-four years.

Vandenberg.—In Mount Vernon, N. Y., on Friday, December 9th, Dr. Marvin W. Vandenburg, aged seventy-seven years.

LONDON LETTER.

(*From our own correspondent.*)

LONDON, *October 25, 1921.*

Conference of Panel Practitioners—Society for Prevention of Venereal Disease—Miss Royden on Sex Morality—Admission of Women to Cambridge University.

A private conference of the panel practitioners of Great Britain was held on October 22nd, to consider the proposed reduction of fees for panel patients. The following statement was issued at the close of the conference: The conference reaffirmed its opinions that the proper capitation fee was thirteen shillings and six pence and that there was no justification on any but patriotic grounds and grounds of public economy for any request that the profession should take less than the eleven shillings awarded by arbitrators in March, 1920. The force of the appeal to citizenship made by the Minister of Health to make some sacrifice for the common good at a great financial crisis, was recognized and the conference declared its willingness to accept ten shillings on those grounds. A deputation from the conference conferred with the Minister, asking him to reconsider his offer to give ten shillings, in order to secure the cooperation of the profession. Sir Alfred Mond declared his inability to alter the financial terms but stated his willingness to offer nine shillings and six pence with a two years' guarantee. He urged that the conference should help him to meet the critical financial situation with which the ministry was faced. The conference agreed by a large majority to accept the Minister's offer.

* * *

The Society for the Prevention of Venereal Disease seems to be making considerable headway, in the direction of propagating and popularizing their views among the members of the medical profession and the general public. This result is largely due to the energy of their honorary secretary, Mr. H. Wansey Bayly. The British Humane Society offered to arrange a conference under its auspices between the Society for the Prevention of Venereal Disease and the National Council for Combating Venereal Disease, a proposal which was accepted by the society but repudiated by the council. Many women prominent in social work, in politics, and in industry, are being invited to join a women's committee of the society, of which Lady Asquith is chairman. It may be said that labor appears to be sympathetic toward the movement for early or immediate selfdisinfection and some well known women of the labor party have openly expressed themselves to this effect. The British Humane Society is circularizing at its own expense, and on a large scale, in favor of the views of the society. The board of directors of the British Humane Society are all professional and commercial men of the highest standing. Mr. Wansey Bayly recently presented the views of the society to the health committee of Pembrokeshire and a resolution moving the adoption of immediate or early selfdisinfection was passed by the Pembrokeshire County Council.

* * *

There has been during the past few weeks considerable correspondence in the *Times* arising from a speech made by Sir James Crichton Browne, as president of the conference of the Sanitary Inspectors' Association, held in Bath, in which he eulogized the merits of immediate selfdisinfection and severely criticized those who opposed it, especially the statement made by Dr. Addison, former Minister of Health, who stated that selfdisinfection was likely to be ineffective, owing to the inherent difficulties involved in the proper application of the disinfectant. Sir James said that there was no more inherent difficulty in the process than in brushing the teeth.

Sir Alfred Pearce Gould took up the challenge of Sir James Crichton Browne, and in a letter to the *Times*, September 8th, pointed out the difficulties of selfdisinfection, declaring that, at least in his opinion, not only was it not so easy as brushing one's teeth but that disinfection was never easy, always requiring care and thoroughness. Mr. Wansley Bayly and Sir James Crichton Browne both replied to Sir A. Pearce Gould's letter, but the most complete reply was made by Sir Archdall Reid, who had had wide experience in venereal disease during and after the war. Sir Archdall pointed out that Sir Alfred Pearce Gould's letter was misleading, in that it conveyed the impression that disinfection against venereal disease was difficult and uncertain. Doubtless all disinfection was somewhat uncertain, sometimes it was difficult, but to judge by results this particular disinfection was the least difficult and uncertain of all. Sir Archdall then gave some striking results showing how venereal disease had been stamped out among the Australian troops in Egypt which had been a veritable hotbed of infection. He related the following facts. At the beginning of 1917 a doctor in charge of 2,000 mixed troops at Portsmouth said to them: "I have talked until I am tired, and you still go wrong. But I will not have you bringing these beastly infections back to barracks, where they are a danger to your comrades. In future, if you incur danger, you must disinfect at once. If you bring a small bottle to my orderly he will fill it for you, or you can buy the stuff from a chemist for a few pence."

Thereafter, for six months, not a single case originated among his men. In twenty-eight months, during which time twenty thousand men passed through his hands, only seven men were infected. In this case the venereal rate worked out one and five tenths in one thousand per annum. In the garrison generally it was ninety-two in one thousand per annum. At that time it was calculated that the infections in London alone among men on leave were one thousand a week. In 1919 the practice of urging soldiers to disinfect at once was adopted throughout the Portsmouth area, nearly all Hampshire and Dorsetshire. The venereal rate fell in the town of Portsmouth from ninety-two to fifty-four and in the area to forty-seven. In the rest of the country it rose from thirty-eight to sixty-four. Almost the whole of the fifty-four and forty-seven was introduced by troops arriving from France and elsewhere.

Sir Archdall then asked his readers to examine the other side of the question. In 1885 the venereal rate of the British Army in England was 275 in one thousand per annum. It sank steadily, and in

1913 was 50.9 and in 1917 was 36. The decrease had been attributed to improved opportunities for recreation. But, the question was asked, could anyone in his senses believe that the young men of today were seven times more moral than their fathers because of such things as cricket, football and billiards? The real truth was that about the year 1885 a knowledge of disinfection began to spread. A bottle of Condy's fluid, permanganate of potash, or other disinfectants, soon became a familiar feature in many homes. To the personal knowledge of Sir Archdall Reid men were beginning to employ disinfectants for the prevention of venereal disease as far back as 1886, and some prostitutes were then offering disinfectants to their customers. The use of disinfectants for this purpose was no new thing, but they had not been used in the most efficient way. Doubtless since soldiers exclusively infect civilians and are exclusively infected by them, the decline of disease among soldiers was accompanied by a corresponding decrease among civilians. But in 1916 two new factors were introduced on the one hand, the army established "venereal ablution rooms," where delayed, and therefore relatively ineffective disinfection was practised. Even delayed disinfection was better than none; hence the fall of the rate from fifty to thirty-six. On the other hand, the National Council for Combating Venereal Disease was established, and subsidized by the Government, began an active campaign of preaching morality and expounding the horrors of disease. To this day its lecturers were forbidden to mention prevention. During the entire period of its activity venereal disease had increased by leaps and bounds.

Sir Archdall ended his letter by emphasizing a lamentable point with regard to venereal disease. He pointed out that a great increase accompanied every war, and the late war had been no exception. But, apart from its magnitude, the present epidemic had one remarkable feature, an immense spread of disease among "decent" women. Nearly three out of four soldiers are now infected by "amateurs." How was it possible to account for the fact that while disease decreased among soldiers it increased among civilians, except on the supposition that the former, being better instructed, practised sanitation more thoroughly than the latter? Again, how was it possible to explain the vast spread of infection among nonprofessional women, who, as a rule, never heard of venereal disease, except on the supposition that men, immoral in any case, but rendered cautious by the exposition of the horrors of the disease, had turned in large numbers from the dangerous prostitute to the pursuit and seduction of the wretched amateur. England was rapidly being converted into a moral and physical cesspool. Sir Archdall declared that at the present time there were about a million guiltless sufferers from venereal disease in the United Kingdom. If vice had been rendered unsafe, so also had innocence.

These quotations from Sir Archdall Reid's letter give a vivid presentment of the case for immediate selfdisinfection from his viewpoint. It is undoubtedly true that there are a good many difficulties in the way of introducing and establishing this method among a civilian population but the question is, are the difficulties sufficient to negative the employment of a procedure which has had so conspicuous a success among soldiers. Sir A. Pearce Gould says they are sufficient and Sir Archdall Reid says more emphatically that they are not sufficient. It would be interesting and would also provide valuable information if medical men in America who have had experience of immediate or early selfdisinfection would give the results of this experience. There are doubtless in America many of those women whom Sir Archdall Reid terms "amateurs" and who are the means, perhaps the most and potent means, of spreading infection.

* * *

Miss Royden, who is a brilliant speaker, has been giving for some time on Sunday evenings a series of addresses which have attracted much attention. These addresses have just been published in book form and it may be said with truth that the book comes at an apt moment when questions of self-disinfection, birth control, marriage, and morality are being discussed with a freedom which would have shocked our grandmothers. It is obvious, however, that there never has been a time when there was greater need for light and plain speaking on questions formerly tabooed. Miss Royden has the courage of her convictions and does not fear to examine these matters on which women have too long been silent. She emphasizes the fact that in the past the cost of socalled morality was almost entirely borne by women. Women were expected to conform strictly to the moral standard, men need not, and, generally speaking, did not. Miss Royden argued that if men need not be chaste, there must exist a certain number of women who could not be so, which reduced morality to a farce. She wished that men would try for a moment to put themselves in the place of a young girl who learned for the first time that prostitution was necessary to safeguard the virtuous. Moreover, she inquired, was not morality a state of mind or will, a spiritual passion for purity, not a material physical thing which was only hers as long as no one snatched it away from her. Miss Royden, in fact, believed in an absolute equality of the sexes. As for marriage, she urged that in the future, all efforts should be concentrated in trying to make people understand what marriage was; what their own natures were; what marriage was going to demand from them, and what they needed to make it noble.

* * *

The fight on the admission of women to the University of Cambridge, culminated on October 20th, when members of the senate again voted on the question which had been before them since 1897, when the senate was asked to grant degrees to women and the proposals were overwhelmingly rejected. This last was a compromised attempt and if carried would have allowed women members of the university to be elected to professorships, to compete for university prizes, and would give them places on syndicates and boards of studies, but would exclude them from becoming members of the senate, the electoral roll, and from seats on the council of the senate. At the same time, it would place a limit on the number of women in the university.

Book Reviews

PHYSIC AND FICTION.

Physic and Fiction. By Sir Squire Sprigge, M. D. (Camb.), F. R. C. S. (Eng.). London: Hodder & Stoughton, 1921. Pp. 307.

Physic and Fiction, by the editor of the *Lancet,* is a judicious and delightful blending of weighty writing, whimsicality and humor. Some of the most insistent medical and social problems are presented and discussed, albeit in parts in a light and amusing manner, yet displaying such a deep and discerning knowledge of the subjects, that one cannot fail to be impressed by the way in which they are dealt with. Strong convictions are expressed, not dogmatically but with a charm and force that is more appealing. Views can frequently be insinuated with greater effect than driven in, as it were, with a sledge hammer. The book throughout is distinguished by an urbanity which is said to be more marked in the medical profession than other learned callings. It will be impossible within the limits of the space allowed to discuss at length the various matters with which the book is concerned and therefore a few of the questions of more or less strictly medical interest will be touched upon.

The title of the first chapter is Medical Priestcraft and here it is pointed out that the mystery which once surrounded the doctor as the medicine man has been very largely dispelled. The practitioner no longer assumes the oracular pontifical pose, for the very sufficient reason that the public generally will not submit to the attitude. People now know something about medicine and take a fairly intelligent interest in some of its more obvious phases. Lay journals, propaganda by health boards and, perhaps, certain cheap medical literature have given the bulk of the population more than an inkling of the processes of cure and prevention. While on the whole this change of view is beneficial for all concerned, it has its drawbacks. Possibly the pendulum has swung too far in the opposite direction. As Sir Squire Sprigge says, this change of attitude, though it now leads at times to hasty and unfair criticism, the lay mind constantly forgetting that medicine must advance by the help of theories that are working hypotheses, is bound to work for the good of all in the long run, for the spread of education must lead to a more widely diffused sympathy with medical aims and a better knowledge of the difficulty of the complex problems doctors are called upon to solve. It must be understood that medicine as yet is not an exact science, although satisfactory progress in this direction is being made. However, in a steadily increasing number of cases medical knowledge is getting ahead of disease, and when this is more widely recognized, a public which now regards the doctor as ineffective because he cannot perform miracles will give him credit for what he. can do. The author draws attention to the fact that the war has brought a wider diffusion of sanitary knowledge, and a quickened avowal of the public debt to medicine, and proceeds to show that the Ministry of Health, if its duties are performed in the right spirit, should exist for the good of the public and the medical profession alike.

An amusing chapter on The Old Fashioned Doctor is in a way a complement to the chapter on priestcraft. As an example of an old fashioned doctor pure and simple, of an original and humorous turn of mind, passages are quoted from an obituary notice, which appeared in the *Lancet,* of the late Dr. Lloyd Roberts who died practically in harness at over eighty years of age. He used to say that he was not a consultant, but "a general specialist with a leaning towards women" and his definition of gynecology as "anything either curable or lucrative" has become a classic. A born healer, it did people good merely to see him. Quite free from illusions, his advice to young friends was sometimes startling: "If you want to be on the staff of a hospital, lad, pretend you are a fool till you're on it. There are two ways of getting on; you can be clever or you can be kind; now you can always be kind. You can't alter that so there's no use a bothering. Always take off your overcoat in a patient's house, if you are there for only a few minutes, they will feel you are not in a hurry." Lloyd Roberts was a great provincial physician and gynecologist, but modern preventive medicine arrived too late for him to do more than admit the advances that were taking place. His old fashioned habits and colloquialisms became the things about which his world talked, yet, there was not in the country a better practitioner.

Medicine in Fiction is a fascinating dissertation on how the novelist deals with disease. In Sir Squire Sprigge's opinion the novelist never seems to have the slightest knowledge of the professional medical life. He is ready enough to credit the members of the medical profession with many shining virtues and equally ready to darken their reputation with calumny, the unfortunate result being to leave upon the public mind the impression that the average medical man is not an average member of society. With regard to the mode in which novelists write about disease, Sir Squire Sprigge is both entertaining and discerning, especially in his review of the handling of medical subjects by the great masters of fiction. So far as epidemics are concerned, they were on fairly safe ground, and some of the descriptions of great epidemics have been vivid and true. But when they come to regional diseases they frequently "fell down badly." Diseases of the heart and lungs are most popular. The author says with truth, however, that the heart disease of fiction is commonly a polite sort of disease, and has few or no premonitory symptoms; it is found out suddenly by the doctor, who issues the warning that at any moment the victim may fall down dead; and sure enough at the right moment, down he or she falls. Such patients have no dropsies or unpleasant complications, though they may suffer from anginous spasms. Sometimes disease is described by the novelist with a good deal of accuracy. An entire chapter is devoted to the medicine of Dickens. On the whole, Dickens treated medicine well. He placed neither the science nor the practitioner on any pedestal, but that he respected medicine is indicated in several ways. He refrained from introducing into his books pathological travesties and did not once make a doctor play a leading part as a villian.

Of the chapters dealing with matters of an essentially medical flavor, the one on the Pathologist in the Street cannot fail to attract and hold the attention of the medical man. It is pointed out that whether the doctor likes it or not he must always be regarding his fellow man in the light of a potential patient, as inevitably as the artist must always find in the scene or the episode the motive of a picture or a story. Sir Squire Sprigge then goes on to explain that it is by no means the person most healthy looking to the untrained eye who is likely to make old bones. Who would suspect, not being able to estimate the evidence before him, the sword of Damocles that is hanging over this red faced cheerful fellow, or see in his cheeks the signal of a fruit over ripe? Again, a sunburnt cheek does not always betoken a robust constitution. The medical man may recognize the imprint of the health resort and be confirmed in the idea by other things pointing to an ominous diagnosis. In the course of this chapter, the advance of plastic surgery is discussed, and the great work done in this branch of surgery at Queen's Hospital, Sidcup near London, by Mr. H. D. Gillies, Mr. L. A. B. King, Mr. Percy Cole, Mr. Kelsey Fry, Mr. J. I. Aymard and Mr. Seccombe Hett. It is pointed out that these men had the advantage of the aid of Professor Henry Tonks, himself a surgeon as well as an artist.

Yet another chapter which will commend itself to American medical readers is that entitled They All Lived Happy Ever After. This is concerned with the marriage question as it presents itself in these modern days. The author holds the view that regulation of marriage for reasons of health and for the benefit of posterity is almost as much of a social as a medical problem. With respect to medical inspection and certification before marriage, he analyzes the matter from several aspects. He grants, and few medical men will disagree, that the obvious degenerates, the drunkards, the imbeciles, and the victims of profound blood poisonings, like syphilis, should, of course, whenever possible, not be allowed to have children, but asks how the medical inspector is to decide in other cases. A considerable amount of difference of opinion exists as to which diseases are hereditary. A few have been shown to be so but even the hereditary nature of tuberculosis cannot be treated by fairminded medical men as a dogma. In short the author declares that the medical profession, in Great Britain, at any rate, "recognizes that the position of independent adviser is a stronger one than that of a state certifier."

In the chapter on Prizes and Performances reference is made to the fact that often the scholar and prizeman did little in after life, while the ordinary man went ahead and grew great. A chapter is given over to public developments in medicine. Medicine in Art is an intriguing consideration of the subject. Comfortable words about poisoning may be recommended to the attention of toxicologists and others and the closing chapter entitled Primordial and Other Stuff, will be of interest to the clubman or to the intelligent man in the street, as well as to the medical man.

The book is broadminded, fair, and written in an ingeniously clever and philosophic way. It appeals to one's intellect and commonsense and is singularly free from exaggeration and redundancy. From the viewpoint of literature it reaches a high standard. Its printing, binding, and general makeup reflect great credit on the publishers.

EMBRYOLOGY.

Textbook of Embryology. By Frederick Randolph Bailey, A. M., M. D., Formerly Adjutant Professor of Histology and Embryology, College of Physicians and Surgeons (Medical Department of Columbia University), and Adam Marion Miller, A. M., Professor of Anatomy, Long Island College Hospital. Fourth Edition, with Five Hundred and Three Illustrations. New York: William Wood & Co., 1921. Pp. xvi-663.

This standard textbook needs little introduction to the medical profession. In the fourth edition certain modifications have been made in order to increase the usefulness of the material. The chapter usually given to the cell has been omitted as being too elemental to warrant a place in a book of this type. An improvement has been effected by the illustration of cleavage, gastrulation, and mesoderm formation by using the lower forms of the amphioxus, the frog, the chick, and finally the mammal. This makes the presentation of this ordinarily dry subject much more graphic. The book will evidently remain a favorite with the student of embryology for some time to come.

DISEASES OF URINARY TRACT.

A Guide to Urinary Diseases. By Adolphe Abrahams, O. B. E., M. D. (Cantab.) M. R. C. P. (Lond.), Physician to the Royal Chest Hospital; Assistant Physician to Westminster Hospital; Physician to Out-Patients, Hampstead General Hospital, and A. Clifford Morson, O. B. E., F. R. C. S. (Eng.), Surgeon to Out-Patients, Hampstead General Hospital; Assistant Surgeon, St. Peter's Hospital for Urinary Diseases. New York: Longmans, Green & Co.; London: Edward Arnold & Co., 1921. Pp. vii-120.

The authors have produced a little work intended to give the general practitioner a survey of the diseases involving the urinary tract, and a description of such diagnostic and therapeutic measures as come within his legitimate province. In the main the object of this collaboration of physician and urologist has been accomplished, the result being a useful and instructive little volume which should prove of real value to the practitioner in cases involving the urinary organs. The work necessarily is superficial in character, many diagnostic and pathological details having been omitted, in order to simplify the work for its intended purpose.

American urologists will take exception to some of the views of the authors, for example, that lavage should never be employed in acute cystitis on account of the irritability of the mucous membrane; also, that carcinomatous disease of the prostate is not usually accompanied by hemorrhage. We find no mention of chronic prostatitis as being a frequent cause of phosphaturia; excessive wear and tear of the nervous system is accepted as the usual cause.

The authors consider the indigo carmine, methylene blue, and phenolphthalein kidney function tests not only difficult but unreliable as well, and recommend the sodium hypobromite test as the simplest. Maclean's urea function test is recommended as being simple, easily performed, and rarely misleading in its findings. The important urinary multiple glass tests, for the determination of the source of blood and pus in the urine, are not given the emphasis which they deserve in a work devoted to the urinary tract, and where they are mentioned, we feel that the authors have disregarded the most recent advances in these diagnostic methods.

On the whole, the authors have succeeded in presenting the subject of the urinary diseases in a manner that cannot but aid the practitioner in his diagnosis and management of these cases.

ESSAYS ON SURGERY.

Essays on Surgical Subjects. By Sir BERKELEY MOYNIHAN, K. C. M. G., C. B., Leeds, England. Illustrated. Philadelphia and London: W. B. Saunders Company, 1921. Pp. 253.

This interesting little volume begins with the Murphy Memorial Oration, delivered at Montreal, in 1920, and ends with The Most Gentle Profession, namely, nursing. The Murphy oration is a beautiful and splendid tribute to the American surgeon, whom Sir Berkeley terms "the greatest surgeon of his time." The speaker recalled the vast procession of famous and heroic figures in medicine and surgery, passing in stately array from Hippocrates and Galen, down to Murphy, each standing, not only as a witness of his own authentic achievements, but also as a symbol of the traditions, ideals, and aims of the age which he adorned. The essay is characterized by sentimental feeling for the departed friend not unmixed with pride and joy in his great career. Those who knew Murphy will readily join in acclaiming this beautiful portrayal of the man.

In The Ritual of a Surgical Operation, the author emphasizes the necessity of attention to surgical details. Surgery is no longer the work of one man, but of a team in which every member contributes his share to the success or failure of the operation. Accuracy and not speed are the essentials in good surgery, and all who practice the art should be possessed of "an eagle's eye, a lady's hand, and a lion's heart."

In Emergencies of Abdominal Disease, acute appendicitis is discussed at great length, and most interestingly. We are inclined to believe that few if any pediatrists will agree with his extreme views on stomachache in children. They will certainly disagree with his dictum that "to give aperients to children who have stomachache is homicidal." He would avoid aperients in all cases of abdominal pain. In adults, as well as children, pain, aperient and perforation are the usual sequence leading to peritonitis. "Therapeutic peritonitis" he terms it. His rule is immediate operation, without exception, especially in children. Unfortunately he does not say what should be done with the constipated child that has a "bellyache." Should every such child be operated on immediately, without an aperient, for fear of perforation and peritonitis?

Other essays of unusual interest complete the work, principal among which is The Gifts of Surgery to Medicine, which constitutes in brief a fine résumé of recent progress in abdominal surgery. The entire volume is replete with surgical lore, expressed in the masterly literary style which Sir Berkeley possesses, and ought to be read by every practitioner of medicine, whether he be a surgeon or an internist.

CLINICAL PSYCHOANALYSIS.

Klinische Beiträge zur Psychoanalyse aus den Jahren 1907-1920. By DR. KARL ABRAHAM. Leipzig, Vienna, und Zürich: Internationaler Psychoanalytischer Verlag, 1921. Pp. 301.

This publication from the International Psychoanalytic Press places before the reader a brief discussion of many important points which arise in the daily practice of psychoanalysis. The papers range from an earlier perior of the author's more limited contact with psychiatric and psychotherapeutic problems through his wider experience in the fruitful field of his private practice. They show also a trained mind which grasps its subject clearly, illuminates it aptly with the material experience has provided, and thereby makes a book rich in interest and peculiarly ready for practical service. It is a volume to which one can easily turn for special enlightenment or which one can enjoy in a wider study of psychoanalytic facts. An English edition will be forthcoming at no distant future.

THE UNCONSCIOUS.

The Unconscious. The Fundamentals of Human Personality, Normal and Abnormal. By MORTON PRINCE, M. D., LL. D., Professor Emeritus of Diseases of the Nervous System, Tufts College Medical School; Consulting Physician to the Boston City Hospital. New York: The Macmillan Company, 1921. Pp. xvii-654.

By some this has been considered a radical book. More progressive psychopathologists, however, will not agree. The stand may be taken that it is better to put a book of this character into the hands of the student rather than one that is out and out reactionary. This, in turn, may be met by those who would rather see an antagonistic point of view presented than one which is a compromise. The fault lies principally in the source of Prince's material and in his trying to retain concepts that are original, though at times cleverly modified. He has become convinced of the importance of unconscious processes from his studies of dual personalities, where his work has been more thorough than that of the ordinary worker.

If his suggestion to clarify thought in regard to the nomenclature of the unconscious was followed, the result would be a grand muddle. He might find some followers among certain schools of workers in France. This talk of subconscious and its divisions into conscious and unconscious, and the frequent overlappings and backslidings indulged in by Prince himself, might prove a way of trying the skill of laboratory psychologists when not occupied with more important matters, but for the practical psychopathologist these ornate trappings are a useless burden.

Little value is attached to the symbol in the rôle of the unconscious mechanism. Inadequate reasons are advanced for early childhood incidents. The author attempts to show the mechanism of forgetting, but he does not show what factors bring this mechanism into action. He does not show the purposive and protective factors which are behind all of these mental acrobatics. He clings to archaic useless terms such as psychasthenia and neurasthenia and misuses them. His antagonism to psychoanalysis is, according to his own confession, due to his failure to master the technic. Cases quoted show a superficiality of handling that would not do credit to a tyro, and yet he draws conclusions as vast as the universe. In one case reported, he stated that his socalled psychoanalysis failed, while hypnosis resulted in cure. Perhaps! He continually borders on psychoanalytical territory, yet is careful to combat the major tenets for fear his personality may be lost in any admission.

On important points we find too much rationalization and a tendency to onesidedness. This tends to vitiate the many useful, yes, helpful points which he has brought out. It is a work replete with weaknesses and yet containing much that may be classed as worthy. The novice will be confused. Only the experienced worker will be able to disentangle the warp from the woof.

JENNY.

Jenny: A Novel. Translated from the Norwegian of Sigrid Undset. By W. Emmé. New York: Alfred A. Knopf, 1921. Pp. 304.

A young Norwegian painter faces reality. So she tells herself, at least, consciously seeking always to see things as they are. But we suspect that this craving for reality is an overcompensation for that unconscious distortion of fact that led her to choose the vocation of painter. She leads a lonely life. Her father died when she was small and her devoted mother trained her in his worship. The mother marries again, a fine man in whom Jenny finds a true friend. The stepfather dies, leaving the mother with three other children, and Jenny slaves to help support them. She accomplishes this difficult feat and is able with the help of a small competence after some years to study art in which her stepfather had given her her early training.

Her psychic struggle finds her close upon thirty and no prospect of love in sight. She is leading a Bohemian life in Rome, free, successful, able to do as she pleases. Helge Gram, a student of archeology, finds her and clings to her, making more insistent demands upon her maternal nature and she convinces herself that this is at last her real love. They become engaged.

Helge, needless to say, is the offshoot of a family situation that is as intolerable as it is frequent—an intellectual mismating, continued through years of hideousness by reason of the children. The parents assume that love for the children holds them together. In reality they are venting their hate on each other, using the children as tools in the conflict. Into this group Jenny comes and awakes to her lack of true feeling for Helge. His father, Gert Gram, recalls both her own father and her stepfather. His early interest in art and their intellectual equality cause them to drift gradually into a father and daughter relation, pulling her back insidiously to an infantile status of dependency. The pain that she fears she must cause Helge in breaking with him leads her to seek comfort and shelter in his father—from which protection she emerges, his mistress. Again she feels this is not her true love and she tries to struggle out of it. She becomes pregnant. The hope of the child as her true goal in like awakens her to creative work again. But the baby dies and she goes through a period of confused depression and struggle between fantasy and reality. Work is her salvation, she knows, so she goes back to Rome. A former art companion and true friend through all her wanderings realizes that he has always cared for her and offers her completion in a life together. Bue she is worn out by her struggle and cannot see clearly what she wants. She feels that she has been untrue to herself and has thus caused misery wherever she went. She is apprehensive of fresh misery, for herself primarily though unconsciously. Her former power of accepting facts and adapting to them or adapting them to her ends has slipped away with the sense of insecurity of her depression, and when an unhappy chance throws her into an intolerable situation with her former fiancé, she gives up and suicides.

Her grasp of the fundamentals of creative life and her splendid struggle to attain poise again really deserved the rewards of happiness. It would not have been outside the realm of the possible. The scene of her death, pictured with beautiful restraint, is intensely dramatic. But it was not the only way out.

GYPSY FOLKLORE.

Ghitza and Other Romances of Gypsy Blood. By Konrad Bercovici. Author of *Dust of New York*, etc. New York: Boni and Liveright, 1921. Pp. 227.

In this thrilling series of tales the student of folklore will find many points of interest. Bercovici has studied the lives of the Rumania gypsy with care. He has told their stories without losing any of the color furnished by these primitive tribes who roam about in a country where the culture has advanced but little beyond their own. Frazer has devoted an entire volume in his *Golden Bough* to the strife between father and son which often leads to the killing of one or the other. In some of these stories we see this same strife carried through to the final tragic end, and so, in addition to having presented a series of absorbing stories, Bercovici has presented valuable material for the student of psychology and folklore.

The tendency which is found in the action of the unrepressed gypsies, is present in all of us, though unrecognized, and when it breaks through in some unrelated form we recognize it as a neurosis or a psychosis. So we can learn more of what is in our archaic unconscious by studying the lives of these more primitive people. We are fortunate in having the material so ably presented.

Practical Therapeutics

Treatment of Pertussis by Intramuscular Injections of Ether.—Paul F. Vacarezza and Francisco F. Inda (*Semana Medica,* October 6, 1921) find that this method has practically no contraindications and that there is an accompanying rise in the pulse rate of eight to ten a minute lasting about an hour. The dose varies with the age of the child from one half to two c. c. and this is given daily for the first three days and then every second day until relief is produced. Six injections usually produced the desired effect. There was transient pain in most cases and occasional local swelling, and temporary polyuria without urinary changes. This method was advocated as long ago as 1914 by Audrain of France, and the writers found in fourteen cases that it gave striking improvement after the first injection, and in most cases after the third injection it was not thought necessary to continue the treatment.

Recognition and Correction of Enteroptosis in Children.—Charles Gilmore Kerley (*Medical Record,* October 1, 1921) gives the symptom complex of enteroptosis in children as habitually poor appetite, recurrent vomiting, nausea without vomiting, eructations of gas and constipation. In the management of these cases the first step is to secure proper mechanical support by an abdominal belt, worn constantly while awake. The carrying requirements of the stomach are lessened and its emptying facilitated by having the child lie down on the right side for an hour after each meal, and by giving only solids at mealtime. Liquids are given equally distant between meals. An anticonstipation diet is given the patient and laxative doses of cascara are given three times daily in sufficient quantity to produce a bowel movement. In some cases nux vomica and belladonna may be added. Daily massage by a skilled operator is helpful where available.

Radium and X Ray Treatment of Carcinoma.—Douglas Quick (*Surgery, Gynecology and Obstetrics,* February, 1921) concludes as follows:

1. The x ray occupies a place in the treatment of every case of carcinoma of the breast.

2. In certain cases radium may be used to considerable advantage in combination with the x ray.

3. The cases in which radium proves valuable in this combination are mainly: a. Localized flat recurrences where surface applications of radium can be made directly over the lesion. b. Bulky recurrences where radium emanation can be embedded directly into the tumor. c. Axillary involvement which is always difficult to influence favorably with x ray alone, where radium emanation can be embedded in the neoplasm or in axillary fat tissue so as to give a diffuse radiation of the axillary space from within. d. Inoperable primary cases where embedded emanation can be utilized to radiate the tumor from within, as well as the axilla, and even supraclavicular space in the same way, if necessary. e. Primary cases refusing operation where treatment may be carried out much in the same way as in the inoperable primary cases.

4. The combination of radium and x ray may, in some instances, change an inoperable into an operable case.

There are certain theoretical considerations which strongly encourage us to pursue the study of that treatment of mammary cancer by radium and x ray. When one embeds radium emanation needles in a primary tumor and in invaded lymph nodes and follows with massive x ray dose through the skin, a powerful destructive effect is produced on the tumor tissue amounting to local necrosis, the lymphatics may reasonably be considered sealed, invisible vagrant cells are incarcerated or destroyed, and all this is accomplished without removing the natural barriers which exist against progressive carcinoma. In fact both types of radiation tend to increase the exudation of lymphocytes and plasma cells and the growth of connective tissue around the tumor, and these are the only natural agents of resistance to carcinoma that we know anything about. The treatment of mammary cancer by these physical agents is, therefore, based on sound theory since it intensifies the natural reaction of the tissues to carcinoma, while producing in addition a very strong destructive action on the tumor cells.

Treatment of Pneumonia.—E. E. Trous (*Military Surgeon,* March, 1921) gives the following treatment used in the Army in pneumonia following influenza. In the endeavor to do all possible to save lives many methods of treatment were tried both for prophylaxis and the cure of pneumonia. In general it seems evident that there has been no distinct advance in special methods of therapy, and that so far the most effective treatment is that afforded by rest in bed, good nursing, a light, easily digested diet, careful observations to detect complications, the treatment of special symptoms, such as cardiac weakness by digitalis, as they arise, the avoidance of unnecessary moving of the patient, and continued care with daily watchful supervision and graduated exercise during convalescence. There seems to have been no value in prophylactic injections of vaccines in the prevention of influenza, nor should there be expected to be, in view of the fact that the casual organism was not known. Assuming that prophylactic injections of pneumococcus vaccine are effectual in preventing pneumococcus lobar pneumonia, no specific effect from such a vaccine could be anticipated, in preventing pneumonia following influenza due to the streptococcus or staphylococcus.

The most important single factor in preventing pneumonia following influenza was early hospitalization, with rest in bed in warm, well ventilated wards and with precautions to prevent infection of one patient with organisms from other patients who might harbor more virulent strains. The value of immediate rest in bed at the onset of influenza was shown in a multitude of instances. Of two large groups of nurses, one group tried to remain on duty while suffering from influenza, while the other group went to bed at the first symptoms of illness, the incidence of pneumonia was almost twice as great in the first as in the second. Many of the severe cases of pneumonia admitted to the wards from line organizations were in soldiers who had sat around in quarters during their first attacks of influenza and came to the hospital only on the appearance of the more severe illness.

Care of the bowels providing for daily evacuation, was important. The establishment of routine treatment to be given in all cases of pneumonia, seemed to be productive of as much harm as good. Under such a rule, whether digitalis, salicylates, opiates, atropine or other drug was so ordered, a number of patients would receive an excess and suffer the consequences of overdrugging. Individualization and common sense were never at a greater premium than in the army camps during the epidemic.

Various forms of intravenous therapy by injecting proteins, vaccines, peptone solutions, solutions of formaldehyde and of glucose were employed, but a review of reports of results obtained does not convince one of their efficacy. It may be noted that their use is not free from danger. Convalescent serum was used and thought to be favorable. Reports lacked controls.

Surgical Treatment of Chronic Infected Open Pneumothorax.—Fraser B. Curd (*Canadian Medical Association Journal,* June, 1921) says that extrapulmonary cavities in the thorax continue to exist and become chronic with resulting persistent sinuses for one or more of the following reasons:

1. The drainage opening is not dependent. In consequence, there is always present in the chest cavity a residual amount of purulent material which acts as a foreign body and is a nidus for bacterial growth.
2. The drainage opening is too small; in consequence there is always a certain amount of purulent material dammed back.
3. Foreign bodies are present; commonly a rubber tube drain employed in the original drainage of the cavity is left in position too long. It is advisable to remove all drainage material as soon as the amount of discharge commences to decrease, or to become serous in character. If there is a reaccumulation of pus, it is a simple matter to reopen the sinus. The other type of foreign body frequently present consists of sequestra, the result of exfoliation of rib ends following resection. Occasionally an infective osteitis is present.
4. A communication between the bronchial tree and the pleural cavity, pleurobronchial fistulæ, is a not infrequent cause of renewed infection of the pleural cavity, and consequent persistence of the condition of open pneumothorax.
5. Dense fibrous membrane formation over the pleura accompanies persistent pneumothorax and continued suppuration. This membrane binds down the lung so that expansion is impossible.
6. Occasionally interstitial fibrosis of the lung tissue takes place, which further interferes with lung expansion.

The following is an outline of procedures which may profitably be employed in the treatment of discharging chest sinuses.

1. Unless there is obvious reason for doing otherwise, remove all drains and give the tissues an opportunity to heal. In our series this resulted in cure in two cases.
2. Explore the chest cavity, remove sequestra, improve drainage, and employ germicidal adjuvants, e. g., hypochlorite solution according to Carrel's technic, bipp, flavine, and Beck's paste.
3. If a dense nonexpansile membrane covers the lung, liberate the lung by removal of the confining membrane—decortication—pneumolysis.
4. If decortication does not result in sufficient expansion of the lung to fill the cavity it is necessary to collapse the chest wall by the removal of one or more ribs, and the section of several.
5. If for anatomical reasons it is impossible to collapse the chest wall and so obliterate the cavity, large flaps may be turned from the abdomen or back and the cavity lined—Beck's operation.

Streptococcic Osteomyelitis of the Temporal Bone.—Harry Boyd-Snee (*Indianapolis Medical Journal,* May, 1921) asserts that this is a clinical entity, the etiological factor of which is identified as a gram positive diplococcus. Cultures from which the pneumococcus has been excluded by test show typical chain formation and are typed as Streptococcus mucosus capsulatus, Streptococcus hemolyticus, and Streptococcus nonhemolyticus. Recovery of the streptococcus from the tympanic exudate in a case of otitis media, either acute exudative or acute suppurative, is sufficient evidence for the diagnosis, which is an absolute indication for immediate operation.

Pneumoperitoneum in X Ray Diagnosis.—L. R. Sante (*Journal of the Missouri State Medical Association,* May, 1921) states that this method was first used in a single case by Lorey in Germany in 1912, but that the first paper based on extensive work was that of Goetze in 1918. Sante's apparatus was an ordinary lumbar puncture needle and a pump from a Potain aspirator, with the bulb of a Murphy drip outfit interposed (vent hole plugged) to prevent the accidental introduction of foreign material from the pump. The use of the stethoscope has been most helpful in determining whether the needle is really in the peritoneal cavity, as the sound of the inrushing air at each stroke of the pump can thereby be plainly heard.

Pneumoperitoneum in Radiographic Exploration of the Abdomen.—H. H. Carelli and F. Canevari (*Revista de la Asociacion Medica Argentina,* January-March, 1920) believe that the injection of oxygen into the peritoneal cavity reveals the form, size, and alterations of the abdominal viscera with a certainty and precision not attained by any other previously employed procedure. The measure is harmless and the writers are now making stereoscopic plates, and are employing pneumoperitoneum in combination with the opaque meal. It must be remembered that the oxygen occupies always the highest location in the abdominal cavity and this is made use of in the taking of the plates. For the upper abdominal region the patient should be in the vertical position; for the pelvic organs, the ventral position is indicated with the pelvis higher than the chest; for the kidneys the lateral position.

Proceedings of Societies

NEW YORK NEUROLOGICAL SOCIETY.

Three Hundred and Eighty-sixth Regular Meeting Held at the Academy of Medicine, February 1, 1921.

The President, Dr. Foster Kennedy, in the Chair.

Infantile Nuclear Aplasia or Infantile Motor Defects in the Cranial Nerves.—Dr. I. Abrahamson considered this condition a congenital and hereditary one, often affecting many generations. According to Zappert the ocular defects were most frequently observed and occurred as a rule where there had been a neuropathic family history. Alcohol or lues played very little part. Infantile nuclear aplasia was often combined with other congenital defects, such as hernias, genital dystrophies, muscle defects, aplasias of other organs; while facial defects were often combined with malformation of the ear or temporal bone. Facial hemiatrophy had been observed; also skin changes. The face might look atrophic and masklike. Moebius first described the condition in 1892 as infantile nuclear aplasia. It had been shown, however, by Schultz, Bernhardt, Zappert, and others that this was not anatomically, or invariably, true. A nuclear lesion need not be primary even if it could be proved to exist. The nuclear, motor nerve and muscle were a biological unit. In the peripheral facial palsy all three branches were affected; in the supranuclear (central) and in many bulbar palsies the lower two thirds were mainly affected; in the congenital motor defects the upper third was motionless, the lower two thirds still might functionate.

The Widening Field of Neurology.—Dr. Walter Timme, in his address as retiring president, first recalled certain of the noteworthy meetings of the past two years. He paid special tribute to the memory of Dr. Southard and the last hour he spent with the society just a year ago. The radium treatment of nerve tissue tumors, as described by Dr. Ewing and his associates, he considered a contribution of inestimable value. Some lack of advance in purely formal neurology there might have been, due to pessimism concerning the efficacy of treatment of organic central nervous disturbances. The age had shown the tendency of mathematical application to the diagnosis of human ills rather than to their correction. The philosophy of nervous affections, studies of personality, psychoanalytical aspects of nervous disease, analyses of character defect, had all had their reflection at the meetings. The recognition of a new disease entity, lethargic encephalitis, however, had urged attention once more to intensive study of the physiology and pathological anatomy of the central nervous system. In this field the work of J. Ramsay Hunt on the basal ganglia and the expounding of a new theory of kinetic control, and the monumental work of Tilney and Riley, the first of its kind, on the forms and functions of the central nervous system, were matters of great achievement. Perhaps the most important of the activities of the society during the past years had been the entrance of neurologists into the social industrial economic field. The threatened socialism of medicine had brought the physician into direct contact with law, politics, and the government of the state, and it was of the utmost importance that if the physician was to be controlled by certain laws he should assist in framing them. The public had the right to know why the physician considered himself the guardian of public health. The society had established two committees as an initial step in the task, one on occupational neurological disease, and the other on neurological standards, or the minimal standards of neurological training with the necessary basic education. The committees had begun their work and it was to be hoped that there would be added in the future a legislative committee to make the results of the work of the two other committees effective.

Finally, the society had not only inaugurated the Association for Research in Nervous and Mental Disease, but this association had held the first meeting and had presented the findings of the symposium (in this instance on lethargic encephalitis) before a representative gathering. Neurologists of the entire country, and some in Canada and England, had been interested by a novel method of procedure adopted by the association, viz., the commission method of jury investigation into the merits of each scientific presentation, in which the proponents were questioned as to their methods of work, their observations, and their conclusions. This method, which had been used with success, was being made the model of many old time medical societies as the best and most economical in time expenditure, and the most meritorious that had yet been devised in the scientific results obtained.

Infections of the Central Nervous System.—Dr. Foster Kennedy, in his address as incoming president, took as his point of departure the findings of the Association for Research in Nervous and Mental Diseases on encephalitis lethargica, and proposed to examine the knowledge available concerning the routes by which organic and inorganic bacteria and toxins gained admission to the central nervous system. It was found that the bulk of individuals with encephalitis had evidence of an injury to the mesencephalon, to the straite bodies, and to the red nucleus. The first sign of infection other than general malaise was usually diplopia dependent on a disintegration of function in the oculomotor nuclei, a district not considered easily accessible to exogenous poisons. The explanation for the attack and the route followed was not made clear, it was merely assumed that the poison or group of poisons responsible for the disease had unknown properties of specific chemotropism for the nerve structures initially damaged. This explanation was not enough. When the anatomical and physiological properties of nervous tissues were first under investigation little or nothing was known of infection, and the constant warfare between the cells and humors of the body and the host of microscopic and ultramicroscopic organisms not even conceived of. The morbid courses of infections were for the first time becoming explicable to us by the portal of the endocrines. A consideration of the pathogenesis of the infections of the nervous system might reveal a unity of morbid processes in many ailments clinically unlike, a pathological synthesis as valuable as the analyses of symptoms customarily made. The reaction of each individual varied with the different physical personalities, possibly in accordance with the different kinds of endocrine balances in each individual. But the minute variations required training to detect the differences between similar appearing objects. Individual reactions to toxins from without would then become visible. Further, just as one man differed from another in his reaction to infection, so in a single organism there were a host of unknown and little thought of circumstances which determined the incidence and distribution of the lesion.

The most common route of infection of the central nervous system was by the airways, guarded by the cilia of the mucosa and perhaps the mucoid material with which the mucosa was lined. It was probable that ferment action from dead or living bacteria effected the first rent in the epithelium, giving access therefrom to the lymphatic and blood systems. Over the respective rôles of these two systems in conveying noxious material there had been much controversy. It would appear that the defensive mechanism of the choroid gland in excluding all hematogenous material unsuited to its purpose coupled with the anatomical continuity of the lymph system with the cerebrospinal pond, made it more than a working hypothesis that by the perineural and endoneural lymph channels of the cranial and spinal nerves toxins could reach with unfortunate ease the cerebrospinal axis. Attempts at producing brain and cord lesions by the intravenous injection of bacteria had failed on account of elective filtration of the choroid plexus whereby large colloid molecules were forbidden access to the central nervous tissue, and the whole group of albuminoid toxins were thus cut off from direct invasion of the brain space. These large molecules could pass easily through the walls of capillary vessels thus breaking from the blood to the lymphatic chain. This permeability of the capillary wall was an important factor in the mechanism of many infections, notably of tetanus. Trismus, one of the earliest signs of the onset of generalized tetanus, even when the initial lesion had been in one of the lower extremities, appeared to be an evidence of a blood borne toxemia, though the mechanism by which the motor root of the fifth nerve was thus early irritated was not clear. In diphtheritic nerve intoxication oculomotor palsy was a constant feature, and the infection of the third nerve nuclei in epidemic encephalitis was common. This especial susceptibility to react to general infection might not be due simply to delicacy of structure but might depend on anatomical avenues for invasion as yet not comprehended. The diphtheritic infections studies by Walsh in the Palestine campaign, often taking the form of socalled desert sores, gave nearly pure cultures of Klebs-Loeffler bacilli, and numerous cases of peripheral neuritis ensued. Most important was Walsh's observation that invariably there was an initial focus, a paresis related anatomically to the site of the infective focus, a circumstance suggesting the perineural lymph stream as carrier to the nervous elements. The poliomyelitis virulence of the mesenteric lymph glands of subjects whose blood was innocuous was another circumstance of moment.

Two cases were described where diphtheritic infection was followed by local polyneuritis and with these Dr. Kennedy correlated certain other cases described as acute infective neuronitis. These occurred as a minor epidemic among soldiers in the field and were characterized by fever, peripheral neuritis and ascending signs of involvement of spinal roots and ganglia. A constant feature was peripheral paralysis of the face and of the lower muscles of deglutition. The pathological picture resembled those obtained experimentally by Orr and Rows in their work on lymphogenous infections.

Dr. Kennedy felt that it was a particular detriment to science that medical talent had developed into a variety of fields distinct and separate from each other, and that no adequate headquarters had been evolved where reports could be received and correlated. The modern student received instruction in animal physiology from physiologists who never entered a ward, and in chemistry from chemists often without interest in either physics or biology. This segregation of different branches of learning was continued into adult professional life. As a society for the advancement of learning it would be advantageous to arouse interest in our problems among physiologists and biological chemists, among pathologists and anatomists, even to include them in our body. Their science would be made humane, our medicine more scientific.

Nanism.—Dr. WALTER M. KRAUS reported a case of nanism of pituitary origin and of Paltauf type combined with a postinfectious striate syndrome, which occurred in a man twenty-eight years of age. The case presented two pictures, which were described separately for the sake of clearness. Dr. Kraus also quoted some of the autopsy notes from Paltauf's original case, described in 1891, in which the findings established the type of dwarfing.

A Case of Brain Tumor.—Dr. E. D. FRIEDMAN reported a case of brain tumor in a man forty-nine years old, a sea captain. The patient complained of pain in the left side of the face and progressive loss of hearing. The left eye at first became smaller. Examination showed the left pupil smaller than the right, the left palpebral fissure narrower. There was hyperalgesia in the distribution of the fifth nerve on the left. Hearing was impaired on the left and a tumor mass was felt in the neck on the left in the angle of the jaw. The rest of the neurological examination was negative. A positive Wassermann reaction indicated antileutic treatment. A mouth later the patient complained of diplopia and there was weakness of the left sixth. Shortly after this the patient complained also of a persistent objectionable taste in the mouth described by him as resembling that of Jamaica rum. He then had three seizures, each preceded by a sharp pain in the left side of the face, things grew dark before him and he had to struggle to keep from falling. Vertigo was present, objects seemed to move to the left; there was no loss of consciousness, but drooling from the mouth and the taste persisted. The attacks which came about a week apart lasted five to ten minutes. Four months after the first admission the patient felt that his symptoms were considerably worse, he had lost vision in the left eye, the eye was very prominent, the swelling of the neck was larger. There was complete paralysis of the third nerve on the left with the exception that the pupil was small. Fibrillary twitchings were noted in the motor fifth. The sensory fifth was completely paralyzed on the left, there was no herpes, the sixth nerve was paretic. The seventh was normal on voluntary innervation, although there was a slight dropping of the left angle of the mouth. There was no nerve deafness on the left. In the Weber test the tuning fork was lateralized to the left. The vestibular tests were not made. The ear drum was retracted on the left. There was percussion tenderness of the skull on the left in the frontoparietal region. No brain stem phenomena were ever observed. The patient became rapidly worse and died after a period of neuroparalytic conjunctivitis and evidence of retrobulbar pressure, rather than choked disc on the left. X ray examination of the chest showed no metastatic foci in the lungs or chest wall. X ray examination of the head was negative.

The general physical examination was negative with the exception of considerable edema of the palate. Blood pressure was normal. Wassermann of the blood was positive. The spinal fluid was clear and under fair pressure. There were 234 cells, globulin was plus, the colloidal gold curve was normal, and the Wassermann was positive. Visual fields on the right were normal. There was no aphasia.

Because of the positive serological findings and the involvement of the nerves at the base of the skull, the patient was at first thought to have a luetic meningitis and he was subjected to intense antisyphilitic treatment. In spite of this, however, his symptoms gradually became worse and he rapidly lost ground. The diagnosis was then changed to tumor involving the middle fossa of the skull on the left. The behavior of the left pupil was explained on the basis of an injury to the dilator fibres of the third. The slight drooping of the angle of the mouth on the left was thought to be due to the sensory loss in the face with resulting diminution of muscle tonus. The seizures were looked upon as probably gustatory fits which found their explanation in the adhesions between the tumor mass and the tip of the temporal lobe. Posterior fossa neoplasm was excluded by the absence of nystagmus, nerve deafness, cerebellar signs and true papilledema.

The pathological findings in this case were reported by Dr. B. H. Fairbanks. At the postmortem examination the following condition was found. The dura was adherent and removed with the calvarium; the brain appeared normal except for some flattening of the convolutions and was not involved in the growth, although some resistance was felt in disengaging the tip of the left temporal lobe, which was slightly adherent to a neoplasm apparently growing from the dura of the middle fossa. The tumor roughly occupied the centre two thirds of the middle fossa on the left side, had overgrown the pituitary body, and overlapped part of the lesser wing and the basilar portion of the sphenoid and some of the petrous portion of the temporal bone. It had surrounded the third, fourth, fifth and sixth cranial nerves at the points of their exit from the skull, and a protrusion forward into the orbit had surrounded the left optic nerve.

Effects of Prohibition at Bellevue Hospital.—Dr. JOHN W. BRANNAN (by invitation) reported that with the going into effect of the National Prohibition Amendment the number of admissions to the alcoholic wards was markedly lessened. When the Volstead law went into effect the same decrease was expected and for the first two months in 1920 there was a marked decrease, but shortly thereafter the admissions began to increase and the last half of 1920 gave a total of 1,386 admissions or only eighteen less than the total admissions for the first half of 1919. The totals for the years, however, showed 2,211 for 1919 and 2,312 for 1920. It had been observed that the admissions had been gradually decreasing since the entry of the United States into the war and a chart drawn up to cover the admissions since 1917 gave the marked decrease in totals from 5,714 in 1917 to 2,439 in 1918. America's entry into the war in April, 1917, was followed by a drop from 628 to 547 in May, 413 in June, 345, 376, 405, 358, 295 and 372 for the succeeding six months. An improvement in general conditions was evident from the fact that the number of patients showing symptoms of chronic poisoning (twenty years ago one of the most important factors in the history and condition of patients in all wards of the hospital) has decreased strikingly.

The Diminished Therapeutic Use of Alcoholic Stimulants at Bellevue Hospital, Beginning Before Prohibition.—Dr. BRANNAN presented charts to show the decrease in consumption of prescribed whiskey in Bellevue Hospital from an average of .59 ounce a day for each patient in 1903 to 0.6 ounce in 1920. This reduction had been observed in other hospitals and has been progressing slowly, almost without attracting attention. It used to be customary to give alcohol stimulation fairly generally in the general medical and general surgical wards, and even in alcoholic cases. These latter now received no whiskey ration, which might possibly account for their exceedingly short sojourns in the hospital at the present time. But even the general medical and surgical wards showed a marked decrease, although this decrease varied somewhat according to the superintendence. A marked increase in the *per capita* consumption in January, 1919, the time of the dying out of the influenza epidemic, was undoubtedly to be explained on the ground of the vast number of influenza patients in the hospital at that time.

Dr. GEORGE O'HANLON (by invitation), in discussing the subject, said that at a hospital conference the question of the use of alcoholic liquor in the hospital was brought up. Practically all the representatives at the conference had had the same experience. One hospital was known to have been prescribing extensively since the beginning of prohibition. No reason for this could be found except the attitude of the staff. The Philadelphia Hospital had had the same experience as Bellevue. They had been able to close the alcoholic wards. During the last three or four months an increase in patients has led them to consider reopening the wards. The Cook County Hospital in Chicago reported the same experience. In short, with the coming of prohibition there had been a large diminution in the number of individuals applying for admission to the hospitals as well as to the municipal lodging houses. The employment problem had probably had an effect here also. An increase had been noted in the last few weeks; four years ago the admissions were 2,300, recently the number went down to 35, and was up to 350 at present. Commissioner Coler reported also a decided decrease in applications to the child welfare bureaus since the advent of prohibition. No recent increase had been noted in this branch of public welfare work.

Dr. Kirby, who had presented at the last meeting of the society a study of the incidence of alcoholic psychoses in the State hospitals, and of alcoholism at Bellevue Hospital during a twelve year period, expressed his interest in Dr. Brannan's figures which dealt more particularly with alcoholism during recent months, especially since the prohibition amendment went into effect. According to Dr. Brannan's figures, there had been some recrudescence in alcoholism during the last few months, but this might be regarded as insignificant when one compared the number of cases now at Bellevue to the number a few years ago. There was no doubt that the habits of people had changed in recent years and one must regard the passage of the prohibition amendment as the culmination of a movement which had been advancing steadily for a decade or more. The emotional reaction of the population to the war, as expressed in terms of alcoholism, was interesting. There had been a steady decline in the number of cases of alcoholism at Bellevue Hospital and also in alcoholic psychoses for some years until just before the United States entered the war, when there was a perceptible rise. Following the declaration of war by the country there occurred a marked drop which, so far as alcoholic insanity was concerned, had continued without further interruption.

Dr. **Hartwell** (by invitation) discussed the lessened use of alcohol as a therapeutic measure. He said that alcohol had been proved to be a depressant rather than a stimulant as usually believed, and surgeons were becoming more firmly convinced that to use it as a stimulant was a failure and actually harmful. In the medical wards the same process took place. The decrease had been the result of the gradual education of the medical profession in the real nature of alcohol. As far as the effect of prohibition was concerned, the country was confronted with the complete overthrow of conditioins of long standing. To be told suddenly to stop the use of alcohol on a certain day naturally caused a struggle, but this would be accepted within a decade. The time was approaching when it would not be used either by the rich or the poor.

Letters to the Editors.

THE CZERNY-KLEINSCHMIDT BUTTER FLOUR MIXTURE.

Philadelphia, *December 7, 1921.*

To the Editors:

I have just discovered quite a serious error in the article by Dr. A. Graeme Mitchell and myself on the Employment of the Czerny-Kleinschmidt Butter Flour Mixture, published in the August 3, 1921, issue of the New York Medical Journal. On page 142, second column, second paragraph, fourteenth line, the sentence beginning "Thus it is sufficiently accurate to use two level teaspoonfuls of melted butter," should read as follows: "Thus it is sufficiently accurate to use two level *tablespoonfuls* of melted butter, two and one half level tablespoonfuls of flour, and one and one half level tablespoonfuls of sugar to ten fluidounces of water." The formula given in grams is correct, but in some way the word "teaspoonfuls" was substituted for "tablespoonfuls," and overlooked completely when the proof was read. I realize that it is quite late to have this correction made, but if you can do it I shall be greatly obliged.

J. P. Crozer Griffith, M. D.

THE TREATMENT OF ORDINARY DISEASE.

New York, *December 7, 1921.*

To the Editors:

Having read Dr. Beverly Robinson's book, *The Treatment of Ordinary Disease,* I cannot refrain from voicing my sincere admiration of the masterly presentation of his views regarding the treatment of disease, especially in surgical interference in gallbladder and appendicular involvement. Dr. Robinson is in accord with the views which I have expressed on many occasions. I fully agree with Dr. Robinson that too much meddlesome surgery, with too great a destruction of organs, is the rule and not the exception, and much may be accomplished through medical treatment and leave the patient with his anatomy intact and in good working order. Dr. George L. Servoss, editor of the *Western Medical Times,* in a personal letter received sometime ago, says: "To my mind there is too much slaughter of various organs, and the removal of this, that, or the other thing does not always bring about the results desired, and sometimes I think that something vital to the economy has been taken away. Too many men are doing operations for the simple reason that more money accrues from surgery than from medical treatment. Many patients have their conditions diagnosed after they are on the table and under ether, and the patient would have been far better off had the knife been forgotten."

Dr. Robinson's book gives the internist a proper place, for it is my belief that sooner or later the internist will come more nearly into his own. I am not saying that surgery is not warranted in many instances, but I do believe were proper diagnosis made and treatment instituted, there would be fewer lives jeopardized.

Samuel Weiss, M. D.

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Miscellany.

Ventilation, Weather, and the Common Cold.—George T. Palmer (*Journal of Laboratory and Clinical Medicine,* August, 1921) presents a study of three types of ventilation systems used in the public schools of New York city, and compares the prevalence of respiratory diseases among the pupils, employing as an index of health the sickness records of the children. The ventilation systems are classified as follows: A, cold, open window rooms, gravity exhaust; B, cool, window ventilated rooms, gravity exhaust, and C, plenum, fan ventilated rooms, with gravity exhaust and with windows closed. The absence due to respiratory illness and the respiratory illness among pupils present at school was greatest in the fan ventilated rooms, type C. The total illness was least in the second group, that is, in cool, window ventilated rooms.

Chlorosis a Toxemia, Not a Primary Anemia.—S. R. Salzman (*Medical Record,* July 23, 1921) insists that chlorosis is not a primary anemia but is due to a nonspecific toxemia. This toxemia is the result of a focus of infection in the tonsils. Iron therapy acts beneficially by reason of its ability to combine with the toxin, forming a harmless organic compound; this not only prevents anemia but also improves the general condition of the patient, but does not produce a permanent cure. A permanent cure can be brought about only by the removal of the tonsils and elimination of the focus of infection. The question may be asked why chlorosis occurs only in girls. To this question there are several answers. In the first place, chlorosis has been reported in boys, by Formonoli, Ferrari, Byrom Bramwell and others. Secondly, it is possible that the type of diet differs in the two sexes at the time of life when this disease is found. Thirdly, boys engage in more healthy sports and outdoor exercises than girls. Fourthly, there is unquestionably a difference in sensitiveness to certain toxins in boys and girls. Lastly there is certainly a greater strain on the bodily functions of the girl during adolescence; the thyroid is called upon in association with the ovaries at this time and constipation is much commoner in girls than in boys.

Dilatation of the Bronchi.—Jabez H. Elliott (*Medical Record,* August 14, 1920) reviews forty cases with the following conclusions: Bronchiectasis is not a rare condition; hemorrhage is frequent and may be slight or severe; repeated examinations of the sputum must be made; clubbing of the fingers and toes is a suggestive symptom; the stereoröntgenogram is invaluable. The single plate is of value only in the diagnosis of the main bronchi or their primary divisions, and is not always satisfactory. For dilatation of the smaller divisions, or in the presence of much peribronchial infiltration and pulmonary fibrosis, the stereoröntgenogram is necessary, and it is an invaluable aid in diagnosis.

Pneumococcus Immunity.—Russell L. Cecil and Gustav I. Steffen (*Journal of Experimental Medicine,* September, 1921) report experiments which demonstrate that monkeys can be completely protected against pneumococcus Type I pneumonia by means of three subcutaneous injections of pneumococcus Type I vaccine, if sufficiently large doses are given. Small doses of pneumococcus Type I vaccine injected intravenously confer an immunity equivalent to that obtained by the large doses given subcutaneously. Protective substances may or may not be present in the serum of vaccinated monkeys and they appear to play little or no part in producing an active immunity to the pneumococcus infection in the lung itself.

Chemotherapeutic Studies with Ethylhydrocupreine Hydrochloride in Experimental Pneumococcus Pleuritis.—John A. Kolmer and Joseph R. Sands (*Journal of Experimental Medicine,* June, 1921) report that the intrapleural administration of ethylhydrocupreine hydrochloride in a dose corresponding to about two c. c. of a 1:500 dilution to the kilo of weight in each cavity, a total of 0.008 gm. of the drug, usually had a marked curative influence on guineapigs and dogs with experimental pneumococcus pleuritis, if such treatment was not delayed longer than twenty-four hours. Multiple injections of one c. c. of a 1:500 solution to the kilo of body weight into each pleural cavity showed even a more pronounced effect. Solutions of ethylhydrocupreine (optochin) hydrochloride showed a pronounced bactericidal activity for pneumococci in pleural pus. The intrapleural injection of mixtures of ethylhydrcoupreine, sodium oleate, and boric acid (Lamar) also produced a decided effect in acute suppurative pneumococcus pleuritis of guineapigs. The present experiments and similar ones on pneumococcus meningitis lead the authors to suggest that in chemotherapeutic investigations certain drugs may be injected into serous cavities in amounts exerting distinct bactericidal activity *in vivo* without producing local irritation or general toxic effects.

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The Position of Medicine at the Beginning of the Twentieth Century Illustrated by the State of Cardiology

By SIR JAMES MACKENZIE, M. D., LL. D., F. R. S.,
St. Andrews, Scotland,
Director of the St. Andrews Institute for Clinical Research, Consulting Physician to the London Hospital.

When I was asked to write an article for the cardiac number of the New York Medical Journal, I thought it would be a good opportunity to draw the attention of my colleagues in America to those conceptions of medicine and methods of investigation which we are using at St. Andrews. Both conceptions and methods are, in a sense, novel, in that they are distinct from those which are dominant today.

The fundamental idea, which has served us as a guide, is based on our recognition of the supreme object of medical science and practice, viz., the prevention of disease. We perceived that this object was the specific aim of many undertakings, and particularly of those which dealt with hygiene and sanitation. Nevertheless, we perceived also that, though these methods had accomplished a great deal, they did not lead to an attack on the general problem of a kind likely to be effective in all circumstances. Many diseases, for example, would, we say, be unaffected by their pursuit. We saw that, to be able to prevent any particular disease, it was necessary to have a full knowledge of disease in general as it affected the human body, to know the circumstances favoring or causing its onset, to recognize the earliest symptoms it provoked, to detect the increase in the number and the modifications of those symptoms as it pursued its course, and to witness its termination in recovery or, if it terminated in death, to determine the state of the organs postmortem.

Recognizing that this was the kind of knowledge necessary to the prevention of disease, we made a census of the diseases which are common among the people in the town of St. Andrews. When we had the results before us, we inquired as to the number of diseases concerning which it could be said that complete knowledge had been obtained. We saw that, except in the case of a few complaints, such knowledge did not exist.

If we take any of the chronic diseases, such as those of the lungs, digestive system, heart and bloodvessels, and kidneys, and ask what we know about the onset and early symptoms of these diseases, we shall find that there is in our knowledge a great defect. Even as regards the majority of acute diseases, our knowledge is vague and unsatisfactory.

This discovery led us to look at the position of medicine today, and urged us particularly to determine what steps are being taken to remedy this special defect in medical knowledge. We find that the defect arises through a misunderstanding of the principles of medical investigation and practice.

We see frequently the statement made that the investigation and practice of medicine is becoming more scientific, and some investigators even assert that they belong to the "scientific side" of medicine. These statements in our view reveal how little is known either of medicine or of science. Because the methods of other sciences are used in medicine, it is assumed that medicine is becoming scientific—as if science consisted in methods! It does not appear to be realized that medicine is a subject distinct from other subjects dealing with natural phenomena, and that, for its proper development, it requires methods and principles as peculiar and distinct from those of other sciences as the methods of botany are distinct from those of astronomy.

If medicine, or any part of it, can today be dignified by the term science, it must be science of a very elementary or rudimentary kind. When a lad learns the multiplication table it may be said that he is getting the rudiments of the science of mathematics. Today our knowledge is as far from the full understanding of medical science as a knowledge limited to the multiplication table is from the higher mathematics. This applies not only to medicine as a whole but to sections of it like that of cardiology.

I had intended to describe our point of view and the principles and methods which guide us in our work, both in investigation and in practice, but the conceptions are so strange to those unaccustomed to them, that I find it would be necessary to present a very detailed elaboration with numerous illustrations, so that this article would be extended far beyond the limits suited to the Journal. I therefore changed my plan, and propose to illustrate our prin-

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ciples and methods by dealing with some aspects of cardiology.

Before entering upon the specific subject, however, it will be advisable to indicate how problems are recognized, and what steps are taken to attempt their solution. Our first step is to attempt to get a clear conception of the problem, and to have a clear idea of the meaning of our terms. For that purpose we must know what we mean by disease. Disease may be defined in a variety of ways, but we have taken a definition which is of practical value. We define disease as the invasion of the body by an agent which produces reactions of an injurious nature.

These reactions which the injurious agent produces are recognized as the symptoms of disease, and disease is recognized only by the symptoms it produces. It follows, then, in all inquiries into disease a full knowledge of symptoms is essential. Symptoms may be studied in different ways, but for the requirements of medical science there are certain ways in which they must be studied: 1. To bring out the clear differentiation of an individual symptom from those it resembles. 2. To reveal the mechanism by which each symptom is produced. 3. To assess its value in order to find the bearing the cause of the symptom has on the patient's future—the prognostic significance of the symptom.

While many of the grosser symptoms of disease have been studied somewhat crudely on these lines, the vast number have not been studied. The symptoms present in the early stages of disease have been practically neglected. Thus, for instance, the symptom which indicates the onset of disease in the vast majority of sick people is exhaustion. But what is known of exhaustion—of the different kinds and their differentiation, of the mechanism of the production of this symptom, or its prognostic significance? Yet exhaustion is a symptom which, when we come to understand it, throws a flood of light upon many conditions not understood today.

Take another common symptom, that of pain. Notwithstanding the clamant nature of this symptom, it has been so little studied that its great significance in relation to the presence of disease is not appreciated. So little indeed is known about it, that the very tissues which, when stimulated, can give rise to pain, and those which do not give rise to it are scarcely recognized. In disease a vital process is involved in the production of pain; but nothing is known of its nature.

Or take yet another symptom—variations in the pulse rate. These have for ages been recognized as affording knowledge of a most valuable kind. What do we know of their mechanism? We may fancy we know a great deal. We may even go so far as to say, in a given case, that an increase in rate is due to suspension of the inhibitory mechanism or a stimulation of the augmentor mechanism—stimulation of the vagus or of the sympathetic—but this after all is mere guessing. We do not know for certain; indeed, we do not know whether there may not be factors at work, of which today we have no sort of cognizance! Our knowledge of the principles of investigation in relation to the mechanism of the heart beat is so limited that inquiries into the effect on the heart of agents like digitalis are rendered abortive. This drug, we are aware, is more effective in cases with auricular fibrillation than in cases with a normal rhythm; but how its effectiveness is produced is a matter of speculation or of the drawing of inferences from a few imperfectly observed facts—a method little better than guessing. One of the greatest obstacles to the progress of medicine, indeed, is just this drawing of inferences from imperfect data and then accepting them as proved. They are in truth no more than provisional hypotheses.

The method we at St. Andrews strive to follow (I say strive, for it is difficult to keep to the straight and narrow path) is, after we have collected a number of carefully observed facts, to seek for some relation between these facts so that we can place them in groups, connected by their affinity to some natural process. We were not long engaged in our investigation when we realized the imperative necessity for doing this. Indeed, we saw that the neglect of that method was one of the causes for the backward state of medical knowledge. The necessity for such a classification is obvious as soon as the manner of the production of symptoms in disease has been recognized. We perceived that when a man falls ill—say from an infection—every organ of the body may be disturbed. The disturbance of one organ reacts upon other organs, so that a great many symptoms may be produced. We found that, in the early stages of a disease, the symptoms detectable were relatively few in number, but that, as the disease ran a prolonged course, they increased greatly and some became much more prominent. Indeed, it happened often that the prominence of secondary symptoms obscured the symptoms of the original condition. In these cases the patient's complaint was likely to be labelled by the most prominent symptoms of the later stage.

The fact, indeed, that a large number of symptoms can arise in the course of an illness has been overlooked, or its significance has been missed. A great deal of present day research is no more than detection of symptoms; and so numerous are the symptoms which one sick person can present that, for their elucidation, there has arisen a vast body of specialists limiting their study to special organs or to the use of special methods. Because of the infinite number and variety of symptoms, specialists have no difficulty in demonstrating that there are symptoms which only their particular methods will reveal. The result is seen today in the enormous collection of symptoms we possess, which symptoms, because we have no understanding of their significance, produce a fog in which the investigator gropes about, vainly searching for a path to follow.

If we look at the evolution of any science, we find that, at some period, it passed through this stage. First there was an accumulation of detailed facts—isolated and incoordinated. Later, but only later, came the recognition that all phenomena are subject to the laws of nature. These laws are few in number. When at last the workers in chemistry and physical science discovered the atomic theory and the law of gravitation a host of unrelated and incoordinated facts fell at once into their natural order and so became charged with their proper significance. Natural philosophy and chemistry thus became sciences. Such discoveries not only dispelled the fog but showed clearly the path of progress.

Medicine has not yet advanced beyond the stage of the accumulation of incoordinated facts; that is to say, the necessity for seeking some natural law to interpret the facts and guide investigation is not yet widely felt.

In our enterprise at St. Andrews we recognized at the outset that, if we should succeed only in adding new facts to the already unwieldy mass, we should but increase the existing fog. Our purpose would certainly fail. We therefore set ourselves to search for a fundamental law, for we recognized that the laws of nature are few in number; that the symptoms of disease are natural phenomena, and that natural phenomena are bound to be governed by natural and definite laws. Guided by this aim, we have already achieved a measure of success. We see a path opened up which, we hope, will enable investigation to proceed in a well regulated and systematic manner instead of in the haphazard manner so generally in vogue at present. But as we go, we find so many defects in medical knowledge that we have to spend much of our time in acquiring elementary information necessary to the first steps.

At the beginning of this article I said that medical science has methods peculiar to itself. One of these methods is the estimation of the significance of symptoms with a view to the ascertainment of their bearing—that is to say, of the bearing of their causes—on the patient's future. This method demands in him who applies it, a knowledge of the course any disease indicated may be expected to pursue. We realize the full importance of this method when we reverse our usual order of thought and look at sickness and its symptoms from the point of view of the patient. A patient consults a doctor because he is conscious that all is not well with him; he acts in the belief that the doctor will not only be able to tell what is the matter with him, but will also be in a position to say whether his complaint is transitory or will get worse. He expects the doctor to inform him whether or not there are remedies which may stop or retard the progress of his complaint or even restore him to health.

These are the matters which the patient considers, and rightfully considers, that the doctor should know; they constitute, as a matter of fact, an essential part of the science of medicine. What is the attitude of the "scientific" branches of medicine to this all important and essential part? We find, on inquiry, that they practically ignore it. So much so, indeed, that neither the steps which must be taken to acquire this knowledge nor even the fact that only certain members of our profession enjoy the opportunities essential to a successful pursuit of it is known. That is to say, the conception of what constitutes medical science is so limited that at present there is excluded from it a field essential to that science. One of the characteristics of this limitation and immaturity is that the introduction of a new concept is followed by a long period of inability to recognize its appropriate application. Exalted expectations, and inappropriate application are, as a rule, witnessed in the first instance.

The history of cardiology exemplifies this in a striking manner. One hundred years ago, on the introduction of auscultation, extravagant claims were made for the stethoscope. Years thereafter were spent in detecting various modifications of the sounds of the heart, and a great deal of research was devoted to finding the causes of murmurs. The nature of this information has never been understood. We find that the idea that auscultation can furnish readymade answers to questions about the capacity of the heart for work is still widely prevalent. The idea, too, is almost universal that modifications in the heart sounds supply information on which a prognosis can be based, and indicate the line of treatment which should be followed. The disastrous consequences of this erroneous conception may be found today in almost every country.

This attitude of mind is one of the most potent factors hampering the progress of medicine. Blood pressure instruments and the electrocardiograph are used today just as the stethoscope was used in earlier years. Variations in readings or records are instantly set down as departures from the normal, and so are accepted as indications for prognosis and treatment. The reason for this, as I have suggested, is simply that medicine has not advanced far enough to enable medical men to cope with the facts which these new methods reveal. The facts are isolated and incoordinated. Their significance is largely unknown. Moreover, in any case, knowledge revealed by mechanical devices, however valuable it may be, is not of the kind required for prognosis or treaetment. What kind of knowledge is required for these purposes? We shall best answer this question by putting another. On detecting what we may take to be an abnormal cardiac sign, what do we fear? The answer comes at once. We fear lest the sign may indicate heart failure. Whether he is aware of it or not, this is also what the patient is afraid of when he thinks something is wrong with his heart. His doctor ought to be able to set his doubts at rest.

But it is immediately obvious that no one can hope to give a prognosis of any value, or even undertake an inquiry into prognosis, unless he knows the mechanism of heart failure, and the symptoms it produces. The question which a doctor should put to himself when he detects what he takes to be an abnormal sign is, Does this sign indicate heart failure, or does its presence foretell the oncoming of heart failure? Concerning how many of the modifications of sounds heard with the stethoscope, of the readings of the sphygmomanometer or of the tracings made with an electrocardiograph are we in a postion to say that we know their significance in this respect?

Or take the question of treatment. How is it possible to treat a case intelligently and scientifically unless we understand the relation of the symptoms presented to heart failure? It will thus be seen that a knowledge of heart failure is absolutely essential to the investigtation of disease of the heart.

Consider the present state of our knowledge of heart failure. There are certain gross signs appearing in patients far advanced in this direction which have long been recognized. Among these are dyspnea, dropsy, and enlarged liver. But what signs occur in the period before these present themselves? And what symptoms do those patients show who die of heart failure before even gross signs are manifested?

I have no hesitation in saying that there does not at present exist anywhere such exact knowledge either of the symptoms of heart failure or of the mechanism of their production as would enable a physician even to conduct an inquiry into the prognosis of these symptoms or the relationship they may bear to various methods of treatment. This may seem an extravagant statement. I therefore ask the reader to try to discover in any modern textbook indications of an understanding of heart failure. He will be surprised at the result of his effort.

About ten years ago a very capable physician from one of our colonies came to work in my department at the London Hospital. He asked me to suggest to him a subject for investigation. I suggested that he should study heart failure. He looked at me with surprise, and said, "Surely that is well enough understood." Then I invited him to give me his conception. He found that beyond the recognition of certain gross changes, which he thought were due to back pressure, he had no idea of the nature of this condition. He felt, however, that the subject must have been exhaustively studied, so I sent him to the library to find out what the authorities said about the matter. He spent, studiously, several weeks reading up all the authorities and came back to me in a state of bewilderment saying, "I can find no one who throws any light upon the subject, though there are many guesses and theories."

This great defect in medical knowledge is due to failure to distinguish between essentials and nonessentials. The mechanism of heart failure has never been understood. Yet this lack of understanding has escaped notice because it has been assumed that an abnormal sign is a sign of heart failure and so is, of itself, enough to justify fear of the condition. It follows that those searching for the signs of heart failure have not known where to look for them. Their attention has been focused on the abnormal signs produced by the heart itself and rightly accepted as indications of failure or oncoming failure. The truth is, on the contrary, that heart failure is never shown by the heart. Certain abnormal cardiac signs may, it is true, be associated with it; but of themselves they are not indications. When this is realized, it will at once be seen that the attempt to detect heart failure by the examination of the heart is as futile as is the attempt to base a prognosis on signs detected in the examination of that organ, either by the unaided senses or by mechanical devices. The study of the blood stream either by blood pressure instruments or by graphic records fails equally to afford this kind of information. As during the last quarter of a century the study of the heart has been mainly limited to what could be revealed by means of instruments, the essentials of cardiology have largely been missed.

It is now more than thirty years since I began the study of heart failure. I could not at first see how to pursue this quest, and for a long time I made no progress. I sought, with the stethoscope and sphygmograph, for signs just as today so many others are seeking with the sphygmomanometer and the electrocardiograph. Gradually—very gradually—I came to see the futility of these procedures, and there dawned upon me the simple idea that the signs of heart failure would not be shown by the heart at all, but by the organs which on account of the condition would be receiving a supply of blood inadequate to their proper functioning.

The appreciation of this simple idea naturally set me searching for symptoms in other organs, and led me to the investigation of a different class of symptoms. In course of time I came to realize that, as the heart has to vary its activity according to the varying activities of the body, the first signs of its failure will be manifested when it is forced to work at its highest pitch. Hence the signs of heart failure are produced by those organs which, during effort, do not receive an adequate supply of blood. It is essential, therefore, to consider in every case the patient's response to effort.

I have dealt with this subject in my writings, and will not further dwell upon it here, save to say that I am still far from comprehending the full significance of this response to effort. Yet after many years of patient observation, I am gradually beginning to understand how to apply the test and interpret the result. I declare with confidence that the importance of the principle of the response to effort has not yet been appreciated by investigators. It has a far wider application than merely to the heart; it is applicable to every organ whose functions vary in their intensity; for it is when response becomes restricted that the first sign of inefficiency or failure is given.

The point I wish specially to make here is that, until we understand the import of this response to effort, we will never understand the mechanism of heart failure. In the investigation of the response to effort, it is necessary, not only that the investigator should understand the principles which underlie it, and be able to detect and interpret the signs which are produced by it, but that he should have the appropriate opportunity of observation. Now this opportunity occurs only to those who see the patient at the beginning of his limitations and who can follow him, step by step, as these increase. They alone are able to note the effect of circumstances of various kinds in his daily life. It is manifest that this sort of knowledge cannot be acquired in the laboratory, in the hospital ward, or in the consulting room. Indeed it is largely because of the thoughtless assumption that these places are able to afford it (or other variety of knowledge) that so grave defects in our understanding exist. These defects can only be made good by handing this problem to the one individual who is in a position to solve it, i. e., the general practitioner.

It would be instructive to inquire into the reason why so simple a matter as this has been so much misunderstood. That reason, I believe, resides in the confused conception of medicine which is dominant today. For instance, I find a learned American author writing, "Specialization more than any other single factor serves to advance a science." While a good deal can be said for this in the abstract, in practice, specialism is almost invariably a hindrance to progress. This is especially true in medicine. An artist friend with whom I was discussing this matter gave me a quotation from a Japanese artist written a thousand years ago, in which he said "specialism is a curse, which misdirects every subject in which it is introduced."

Without going as far as that I believe that specialism, as understood and practised today, has an evil influence on the practice of medicine. While it may help in one direction it hampers in others, and it is a question whether it does more good than harm. The harm is not due to specialism in itself but to its application—in the sense that the specialist is expected to undertake services which he is incapable of performing.

Nor is the reason of this far to seek. Our greatest need is a full knowledge of disease from its onset to its termination. Specialists deal only with some phase of disease. With the exception, perhaps, of gonorrhea or syphilis, no specialist has any accurate knowledge of the onset or the early stages of the disease in which he specializes. If we take the diseases even which are common among the people we find that no specialist can recognize them till they have advanced so far as to have produced irreparable damage to the tissues. What I ask is, Do we know of the onset or early stages of such diseases as gastric ulcer, consumption, arteriosclerosis, chronic heart disease, or kidney disease? No specialist can describe the cause, onset and early stages of so common a disease as adenoids.

Moreover, a specialist is, by the nature of his calling, a man with a limited experience, and therefore he can have but a limited outlook. That this is a great drawback, when the specialist steps outside his specialty, can readily be understood. I have pointed out above that, in a sick man, every organ of the body may be disturbed. The signs of such disturbance are prone to be looked upon as symptoms of disease and the consequence is that a specialist may be called in and may detect symptoms peculiar to his speciality which in fact are effects and not causes. He is all too likely to interpret these symptoms as evidence of disease in his particular organ. So we find a patient visiting specialist after specialist, and getting a different diagnosis from each.

Now it usually happens that all these diverse symptoms are the outcome of one provoking cause, and if the mechanism of symptoms were understood this would be recognized and the provoking cause sought for and dealt with. That may seem a commonplace saying for every one nowadays is constantly uttering some such formula as "it is the man we are dealing with," or "it is the soil which has to be considered." Nevertheless, medicine has not advanced so far as to enable any one to understand how to examine a patient on these lines.

That which is true of all forms of specialism is particularly applicable to the cardiologist or "heart specialist." We hear today of men devoting themselves entirely to the study of affections of the heart. Their method accords well with the ideals of the moment, and appeals to the public; but it shows a complete misconception of the principles of medical practice. There is no organ in the body whose various activities are so greatly modified by the disturbed functions of other organs or by the presence of the agents of disease as the heart. The modified activities of the heart are indeed numerous; they afford plenty of opportunity for ingenious investigation; yet it is utterly impossible for any one who limits himself to these manifestations to discover the origin of heart symptoms.

In consequence the heart specialist rarely recognizes the true nature of a patient's complaint; his treatment, therefore, cannot be based on rational grounds.

One result of this form of specialism is that medicine is kept in that rudimentary state, in which a laboratory device is regarded as representing the highest ideal. The specialist who uses these devices argues that clinical medicine has hitherto been extraordinarily inexact as to its facts, which have depended only on the personal skill of the doctor—an unsafe and unreliable instrument. He, on the other hand, employs methods of exactitude. His observations, moreover, are more "scientific" in that he employs the resources of other sciences and gets records by means of accurate instruments.

This conception as I have suggested is superficial and rudimentary. It appeals to that stage of mental development at which a spectacle carries more conviction than a process of reasoning. Its limitations can best be understood by an illustrative experience. Nine years ago I was consulted by a man sixty years of age who complained of a feeling of distress. At first his description was vague and confused; but by appropriate questions I obtained the information that, among his sensations, was one of pain, of a particular kind. I gathered that there was some digestive discomfort; but I recognized that the pain was cardiac in origin. A physical examination revealed no sign of disease. I told him that this pain was a certain indication of a slow process of degeneration in his arteries, especially in those of the heart, and that therefore it behooved him to recognize his limitations and live accordingly. I gave him some directions as to the management of his life.

I did not see him till about two years later when he called on me. In reply to my inquiry as to how he was getting on, he said, "badly." I asked him if he had followed my advice, and he said no. I asked why, and he told me a long story. A friend to whom he had confided my opinion had, it appears, urged him to place himself under a famous professor in a far country. He traveled there and saw the professor, who immediately arranged for his examination by a series of specialists. For five days he was mostly undergoing some form of examination. The specialists examined him by the x rays, gave him test meals, analyzed the contents of his stomach, his bladder and his bowels, estimated the character of his blood, and used a number of instruments, such as the electrocardiograph and the sphygmomanometer.

At this point in his narrative the patient paused to comment on the thorough nature of the examination and on the wonderfully scientific character of the specialists. "Well," I said, "What was the outcome of all this." "Oh," he said, "the professor informed me, on reviewing all the reports, that my heart and bloodvessels were perfectly healthy, and that all that was wrong was a slight error in metabolism which he declared he would correct by a modification of my diet." "What did he say of your pain?" I asked. "Oh, that, he told me, was a little indigestion of no importance." "Well, how did you go on?" "I followed his advice and adhered strictly to the diet, but this pain has got gradually worse, and, as your predictions have come true, I have come again to see you."

It is needless to state that his description of his sufferings now left no doubt as to the nature of his trouble. The manner of his death six years later confirmed my opinion on this matter.

Here is a glimpse into the true nature of socalled medical science. This man's pain could not be measured by an instrument, therefore, according to the present day conception, it was not worthy of consideration. The truth is that there are phenomena in medicine, essential phenomena, which are too subtle for the coarse methods of the laboratory to detect, and which demand, in those who would understand them, an education of a particular and far more exacting kind than that necessary in order to master laboratory technic.

Let me ask a further question. How was it that I was able to recognize the nature and significance of this man's pain? For more than thirty years I had been engaged in the study of pain. There was when I began my work so little known of this symptom that I had to make a long investigation into its mechanism to find out what tissues gave rise to it and what stimuli were capable of provoking it. Then I had to devise measures for discriminating between different kinds of pain, and to determine their relations to the different disease states which provoked them. During all this time it was necessary to keep in touch with patients, to watch the progress of diseases, and to see how they terminated. Thus, in the cases of patients such as the one I have described, I followed the histories from the first onset of the symptom. I studied the condition of the circulation. I noted the response to effort and observed the associated phenomena. Then I watched the modifications of symptoms which took place during the years following their onset and right on till the termination in death. After death I had a careful postmortem examination made.

To recapitulate, medicine today is accumulating such a vast mass of incoordinated details that it has become necessary to split it up into an ever increasing number of specialties. And these, by adding to the mass, actually obscure the path of progress in an impenetrable fog.

It is manifest that if progress could only come by such an increase in the number of specialists, the outlook would be so black as to cause despair. Happily, however, the blackness of this outlook today holds within it the means of salvation. By and by it will be asked what effect has all this specialism upon the diseases common among the people? What is it doing to prevent illness? Then at last the fact that specialism is mainly concerned with the treatment of the damaged individual will be recognized, and a desire for a better conception will be created. The old theologians were wise in their generation when they pointed out that before a man is meet for repentance he must have been brought to a recognition of his sins. Before there is any prospect of an improvement in the methods and practice of medicine, the limitation of the present conception must be recognized. This will happen when it is understood that science tends to simplification and precision. The methods of today, on the contrary, tend to complication and confusion.

In dealing with the subject after this fashion I am not decrying laboratory methods as such. I recognize as fully as anyone that progress cannot be made without them. What I am striving for, is that they should be used in their proper sphere, and not be asked to throw light upon matters beyond their capacity. I want indeed to save them from that discredit which because of their failure to fulfill the expectations of their advocates, undoubtedly threatens them both now and in the near future.

Prognosis in Heart Disease

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When we consider the enormous output of books on the subject of cardiac affections, it is strange to reflect that the ancients imagined that such an important organ as the heart was invulnerable to disease. We must remember, however, that rheumatism is not a common disease in Southern Europe nor are the inhabitants of those regions large meat eaters or heavy drinkers, both important factors in the degenerative form of cardiac disease. Prior to the discovery of percussion and auscultation it was hardly possible to detect heart disease clinically until it was in a very advanced stage. What perhaps is most striking to us nowadays is the length of time during which a patient with an organic disease of the heart can enjoy comparatively good health and be capable of doing quite a large amount of work.

In few diseases can the prognosis be so important as in cardiac affections, because it touches life at so many points. In the first place there is the usual question of how long a man is likely to live, the life assurance point of view. Then there is the question of the probability of sudden death, which the very diagnosis of heart disease still spells to such a large number of the laity. Then there is the important question of occupation, must a man give up his work or with what modifications can it be carried on. Again in the case of children after an attack of rheumatism or chorea when the heart has been obviously affected, how soon can they with safety return to school and with what exceptions as regards drill, exercises, etc. Most important, too, is the advice to be given to women with cardiac lesions as to marriage, pregnancy, and childbirth, and finally there is the question of under what circumstances anesthetics may be inadmissible.

In framing a prognosis in any given case of heart disease the most important thing is to be clear as to the cause of the cardiac lesion. Broadly speaking we may divide cardiac affections into those which have been caused by rheumatism or chorea, on the one hand, which manifest themselves in early life, and on the other, those which are due to degenerative, arteriosclerotic conditions which do not as a rule appear till about middle age. From the point of view of prognosis it is of more importance to decide whether a given lesion is of rheumatic or arteriosclerotic origin than to decide which valve is affected. Speaking generally, the prognosis is much better in the rheumatic cases where the lesion is likely to become stationary, whereas in the arteriosclerotic cases the lesion is almost necessarily progressive; in the case of young children, however, though the lesion is nearly always of rheumatic origin the outlook is usually serious, because so often the pericardium and myocardium, as well as the endocardium, are affected; there is in fact a pancarditis.

MITRAL DISEASE.

Mitral disease, mitral stenosis in particular, is most commonly associated with rheumatism and especially with the less pronounced form of rheumatism, such as vague, indefinite pains in the limbs, stiff neck, etc. This lesion of stenosis is much more common in women than in men and for a long time may give rise to no serious symptoms. Possibly owing to the greater tranquillity and more sedentary character of the lives of women they may be less affected by the existence of this lesion than are men. In these cases the heart, as the French say, is *réglé pour un petit travail.* With reasonable care such hearts may carry on for a number of years and the condition should not be a bar to marriage and childbirth. But when once the heart has begun to fail in these cases, compensation is not so easily restored as it is in the case of mitral regurgitation; the narrowing of the mitral orifice causes an imperfect filling of the left ventricle, consequently the heart obtains an insufficient supply of blood so that cardiac weakness is in consequence promoted.

Mitral stenosis, when established in late childhood, has a more serious prognosis than if it first occurs in adult life; this is partly owing to the fact that the stenosed orifice does not increase in size while the growth of the heart continues. In such cases the patient can seldom reach the age of forty. An unfavorable feature is the development of catarrh of the bronchi and the more extensively the finer branches are involved and the more diffusely the process has extended, the worse will be the prognosis.

It must further be remembered that it is especially in cases of mitral stenosis that auricular fibrillation is most likely to supervene and here the prognosis must always be serious, because fibrillation of the auricles almost invariably indicates myocardial changes. Though auricular fibrillation may start fitfully at first, with perhaps some short attacks of paroxysmal tachycardia, when once it has definitely set in it will continue for the rest of the patient's life.

Since this condition is associated with a rapid and irregular action of the heart it necessarily tends to embarrass the efficiency of that organ, and the prognosis depends on how far the heart can carry on its work with a new rate and rhythm. The normal activity of the auricles is not essential to the action of the heart, but the fact of their being diseased implies changes in the muscle of the ventricles also, and it is this which eventually causes a fatal issue.

Fortunately, it is just in the case of this particularly serious lesion that digitalis proves most effective, and especially when the fibrillation of the auricle is connected with mitral stenosis of rheumatic origin, this drug seems often to act like a specific. Consequently, by a judicious use of this remedy together with rest and a generally restricted kind of life, patients suffering from auricular fibrillation of this origin will live on for some years, particularly if it has been found possible to avoid exhausting the myocardium by keeping down the ventricular contractions to about 70, but they will have definitely passed to a lower plane of cardiac activity.

On the other hand, auricular fibrillation occurs more frequently perhaps than is generally supposed in cases of arteriosclerosis. Here, of course, we have the older type of patient to deal with, and, as a rule, the fibrillation is of a more moderate grade and the patient may seem less affected by it. Unfortunately these cases do not respond so well to digitalis as do those of rheumatic origin in younger subjects. In such cases then the prognosis depends rather on the cardiosclerotic condition than on the auricular fibrillation *per se.*

Mitral regurgitation of rheumatic origin and unassociated with stenosis is far less common than was formerly supposed, owing to the fact that regurgitation used often to be diagnosed when there was little other evidence of it beyond a systolic murmur at the apex. The main danger in early life is the susceptibility to further attacks of rheumatism, any one of which may render still worse the already existing cardiac lesion, but with the lapse of years this susceptibility becomes less. The most satisfactory thing about mitral regurgitation is its amenability to treatment. Again and again the heart may break down temporarily with dropsy and all the signs of backward pressure, and again and again by judicious treatment the patient may be restored to his former level of health; it is this power of recovery under treatment which has given to mitral regurgitation, when of infective origin, its traditionally favorable prognosis. In considering the outlook in a given case of mitral regurgitation, as in other cardiac lesions, it is well to inquire carefully into the hereditary history. Assuming that the patient comes of a long lived stock with no special susceptibility to rheumatism, there is little reason why the fact of having mitral regurgitation should prevent his living out the full span of life.

When mitral disease is of arteriosclerotic origin, the prognosis is obviously more serious, for here we are no longer dealing with a single definite quasi-mechanical valve lesion, but the valve lesion is part and parcel of a wider whole, the heart muscle, arteries and it may be the kidneys being affected in one way or another so that there is a most definite limitation to a man's artivities and his span of life is most materially shortened.

AORTIC DISEASE.

Here the difference between that form of the disease which is of rheumatic origin, on the one hand, or due to degenerative conditions on the other, is most striking. The main point to realize is that the aortic disease of the rheumatic patient, apart from the risk of later attacks of rheumatism, may be more or less stationary, we have in fact what might be called a static lesion which carries with it a most favorable prognosis not only with regard to length of days, but more particularly from the point of view of the amount of work which can be accomplished, this is the cardiac lesion in which the capacity for work is greatest. During the war it was astonishing how often one encountered cases of aortic regurgitation which had slipped through the vigilance of the recruiting examination and had yet carried on successfully in the infantry, only having to go into hospital for some surgical condition or for a fever, such as malaria, when the cardiac lesion was accidentally discovered. In all forms of heart disease it is important to realize that often fairly hard work can be done if it is steady and regular and the man has grown habituated to it, whereas he would prove quite unequal to work which was less intrinsically laborious, but which was irregular and spasmodic. In advising upon an occupation it is well to consider, in addition to the amount of mechanical exertion, whether it will expose the patient specially to vicissitudes of weather and sudden change of temperature, also it is well to remember that often it is not the work *per se* which proves too much but the troublesome journey to and from it, catching of trains, omnibuses, etc.

Turning now to the arteriosclerotic forms of aortic disease, the lesion here is almost necessarily progressive, though with careful treatment it may remain stationary for a time it can never really improve, owing to the changes which are fairly certain to have taken place in the coronary arteries. Now it is these changes in the coronary arteries which give rise to the most serious symptoms connected with aortic disease—namely, angina pectoris—which is serious not only on account of the very severe pain and alarming condition of the patient, but because it indicates the probability of considerable degeneration of the cardiac muscle and the consequent likelihood of sudden death. In the arterial forms of aortic disease which are of syphilitic origin, and these since the institution of the Wassermann reaction would seem to be increasingly numerous, one should be specially careful to give a guarded prognosis, for though the symptoms in these cases can be more readily alleviated by iodide of potassium than in other forms of the disease, there would seem to be a special liability to sudden death, probably owing to the fact that the myocardium, no less than the aorta, has been damaged by the syphilitic poison; there is also the likelihood in these cases of an aortic aneurysm developing.

As to the physical signs in connection with the prognosis of aortic disease, generally speaking it may be said that the more collapsing the pulse the greater will be the regurgitation. Changes in the character of the murmur are generally not of much importance, alterations in the cardiac dulness are more valuable, an increase in the transverse area of dulness being usually a bad sign, whereas the increase vertically may be a good one. When the second sound in the aortic area and over the carotids is entirely obliterated by the diastolic murmur, it undoubtedly indicates that the amount of regurgitation is considerable, and to that extent the prognosis is bad.

MYOCARDITIS.

Apart, however, from the various valvular lesions which we have been considering in detail, there lies the question of the condition of the heart muscle which may be seriously damaged without any very obvious physical signs and where we have to rely very much on the history and the symptoms. Of recent years great attention has rightly been directed to the condition of the heart muscle in prognosis, but it is a mistake to think that this is an entirely new conception. Laennec himself had realized the importance of the cardiac muscle, regarding it as the key to cardiac pathology and, he might have added, to the prognosis of heart disease. Stokes, too, may be quoted as having said, "It is in the vital and anatomical condition of the muscular fibres that we find the way to cardiac pathology; for no matter what the affection may be, its symptoms mainly depend on the strength or the weakness, the irritability or the paralysis, the anatomical health or disease of the cardiac muscles." But in medicine, as in art and philosophy, there are fashions and man is ever prone to extremes, so difficult is it to keep in the mean, still more to be enthusiastic about it. The discovery of auscultation focussed the attention of the medical profession upon murmurs and, while their whole significance has been very much overrated in the past, perhaps now we may be in danger of swinging to the other extreme and, with our attention concentrated on the heart muscle, be inclined to neglect unduly the significance of valvular lesions.

In all disease we know that in framing a prognosis it is of primary importance to regard the patient as a whole and not to let oneself be led away even by pronounced and very evident physical signs and this is particularly true of heart disease. Thus, for instance, the obvious and striking signs of aortic disease may be intrinically of less importance than the more subtle and indefinite evidence of a syphilitic myocarditis. What was said by Bastiat in connection with the political economy, *ce qu'on ne voit pas est plus grand que ce qu'on voit*, may with equal propriety be applied to diseases of the heart.

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Syphilis of the Medium and Smaller Arteries*

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In a recent monograph (1) Ophüls, in his conclusion, states that "Syphilis is of great importance in the production of disease of the aorta and of the cerebral arteries. Its etiological importance in arterial disease elsewhere in the body is still undetermined, but does not appear to be very pronounced." Again, on pages 24 and 25, he says: "The belief that chronic syphilis is an important cause of generalized arteriosclerosis is much more widely prevalent, and has again been expressed in no uncertain terms by several authors recently, on the basis of general impressions, or as a result of a study of the histories of such patients; but I fail to find anywhere a conclusive proof of this contention. We are well informed in regard to the effects of syphilitic infection upon the wall of the aorta, and the luetic disease of the cerebral arteries first described by Heubner forms a very definite clinical and pathological entity, but how often syphilis causes disease in other arteries, or whether it does so at all, is still an open question." Ophüls bases his conclusions upon a study of the literature and a statistical analysis of five hundred autopsies. It is significant that out of the one hundred and fifty-one references given of researches concerning vascular disease only thirty date since 1908, which date marks the beginning of modern spirochetal studies of syphilitic lesions; and not one of these thirty references is concerned with a study of vascular syphilis. The scattered reports in the literature since 1908 of the demonstration of Spirochæta pallida in vascular lesions other than those of the aorta and cerebral vessels have not been considered, although such reports do prove that syphilis does cause disease in other arteries. Ophüls's article is clearly written from the viewpoint of arteriosclerosis and not from that of vascular syphilis.

The latest editions of the great textbooks on special pathology offer but little that is new. Benda's article in the Aschoff discusses with conviction, with reference to syphilis of the arteries, only syphilitic mesaortitis and Heubner's syphilis of the smaller cerebral arteries. Kaufmann says that "Syphilis frequently damages the arteries, the smaller (coronary, cerebral) as well as the aorta." And all of the lesser pathological textbooks repeat these statements, so that nowhere in the critical literature of the day do we find any definite statements made concerning syphilis of the arteries other than that of the aorta, cerebral and coronary arteries.

I have already reported two cases of extensive syphilitic disease of the pulmonary arteries and branches, one with aneurysm and demonstration of spirochetes in the pulmonary arterial lesions (1917). In that paper I showed that the disease of the wall of the pulmonary arteries, even in the smaller branches, was identical with syphilitic mesaortitis, in that the lesions consisted of perivascular infiltrations of the vasa vasorum, in the adventitia and media, leading to obliteration of the arterioles, and sclerosis and degeneration of the intima.

Recently the study of the medium sized and smaller arteries in syphilitics has been taken up in this laboratory with a view of determining, if possible, the extent of syphilitic involvement of the smaller vessels, and the degree of vascular damage for which this infection may be responsible. An autopsy material of one thousand two hundred and fifty cases, including four hundred cases showing lesions of syphilis, and an additional fifty autopsy cases of tabes and paresis from the State Insane Asylums, have been studied from the viewpoint of the vessels. In the greater part of the material only the smaller arteries of the various organs, the vasa vasorum of the aorta, and the mesenteric branches were available for study. Only in special cases was material available of the smaller arteries of the extremities. Recently we have made it a practice to take portions of the smaller arteries in the routine autopsy. This study is, therefore, in a very incomplete stage, and the present report is only a preliminary one. Nevertheless a number of important facts are shown by the material, and it is of value to report them at this time.

1. ARTERIOSCLEROSIS IN THE SYPHILITIC.

A more or less generalized arteriosclerosis was shown by ninety per cent. of the autopsy cases of syphilis, in the tertiary or latent stage. In the majority of cases this is a premature sclerosis, as far as age is concerned, occurring in middle life. Compared with nonsyphilitics of approximate similar ages the incidence of arteriosclerosis in the syphilitics is twenty-five times greater in the latter in the middle adult years, when sclerosis normally should be absent or just appearing, and is always more marked in the older syphilitic than in the nonsyphilitic of similar age. It shows particularly in the renal, splenic, mesenteric, prostatic, coronary and cerebral arteries. In the great majority of cases there is no material giving evidence as to the condition of the arteries of the extremities. The renal arteries are by far the ones most frequently involved. The arteriosclerotic lesion in the smaller arteries of syphilitics is usually a thickening of the intima with hyaline change, and without any evidence of an inflammatory process in the form of cellular infiltration in the wall of the vessel or around it. We have never found spirochetes in the walls of such hyaline vessels. If the hyaline thickening is due to the local action of spirochetes in the intima it is practically impossible to prove it. The hyaline sclerosis must represent a healed lesion, but prolonged studies of the material fail to show any earlier active stages of such intimal sclerosis, either in the form of inflammatory infiltrations or cellular proliferations of a syphilitic type.

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Early or transition forms of this lesion showing a primary inflammatory reaction have not been found. On the other hand, there is every transition stage of hyaline thickening of the intima with changes in the elastic tissue from the slightest to the most marked degree. The entire lack of any reactive process makes it extremely unlikely that such a vascular change is due to the local action of a parasite. Elsewhere in the body the presence of the spirochete in chronic syphilis is made known by a cellular reaction, although such reaction is often slight. The predisposition of the syphilitic to hyaline sclerosis of the smaller arteries must probably be explained otherwise than by a local action of the spirochetes upon the intima. In spite of the fact that the renal arteries of the syphilitic most frequently show hyaline sclerosis of the intima, active syphilitic lesions in the kidney have been demonstrated in less than a dozen cases, and in those cases the vascular lesion was of an entirely different type, consisting of perivascular infiltrations or a proliferating endarteritis leading to obliteration of the lumen. It seems most probable that the excessive incidence of hyaline fibrosis of the intima of the smaller arteries in syphilis is a secondary process, either toxic or mechanical in origin.

Fig. 1.—Syphilitic mesarteritis of femoral artery. Femoral aneurysm. Spirochæta pallida demonstrated in walls of artery and aneurysm.

2. SYPHILITIC ARTERITIS OF ILIAC, FEMORAL, POPLITEAL AND TIBIAL ARTERIES.

Syphilitic mesarteritis of the iliacs and femorals occurs in all cases of marked syphilitic mesaortitis, and spirochetes have been demonstrated in such lesions. Syphilis of these arteries is essentially the same as in the aorta. It is primarily a disease of the vasa vasorum of these vessels, shown by plasma cell infiltrations around the vasa in the adventitia and media with corresponding degeneration and fibrosis of the intima and media. All of these changes seen in aortic syphilis are seen in these vessels, and syphilitic aneurysm occurs in these also. In our material we have one autopsy case of femoral aneurysm with extensive syphilitic disease throughout all of the arteries of the leg, leading to gangrene. Spirochetes were demonstrated in large numbers in the wall of the aneurysm and in the arterial lesions. Two operative cases of popliteal aneurysm in young adults with early tertiary syphilis showed extensive syphilitic infiltrations in the wall of the aneurysm and artery.

From the clinical viewpoint syphilis of the tibials and their terminal branches has been more common than that of the larger arteries of the leg. We have found such active syphilitic arterial lesions in leg and foot in cases of perforating ulcer, gangrene, symmetrical gangrene simulating Raynaud's disease, and sclerosing atrophy of the foot. In the case of the smaller arterial branches the syphilitic lesion may appear as a panarteritis, periarteritis or proliferating endarteritis. Small arteries showing a proliferating and obliterating endarteritis often present extensive perivascular collections of plasma cells. In these spirochetes are most likely to be found; but the number is usually small, and they can be demonstrated only in well fixed tissues. Our best results have been obtained in formol fixation of several weeks' duration.

The clinical symptoms of syphilitic arteritis of the arteries of leg and foot are due to the more or less marked obliteration of the affected vessels and the consequent disturbances of nutrition. The most extensive disease of these vessels may exist without clinical signs of syphilis elsewhere, and the syphilitic lesions in these vessels may be much more marked than in the aorta. We have had, however, two autopsy cases of gangrene of both legs in which the aorta and all of its branches below the diaphragm showed the most active syphilitic arteritis. In one case, in a young adult negro woman, the renal and adrenal arteries showed severe involvement. The coronary and cerebral arteries also showed extensive panarteritis and obliterating endarteritis of syphilitic type. Unfortunately the arteries of the upper extremities were not examined microscopically.

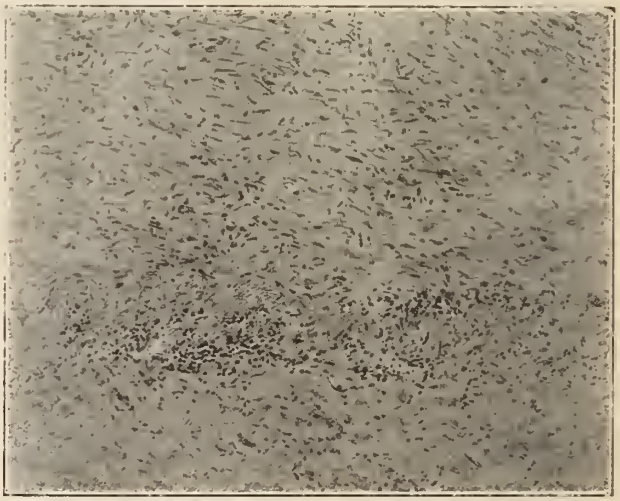

Fig. 2.—Syphilis of femoral artery. Higher power of preceding, showing plasma cell infiltrations around thickened vasa vasorum, at outer margin of media.

As to the occurrence of syphilitic arteritis in the upper extremities we have practically no knowledge, inasmuch as the arteries of the arm, up to the present time, have not been included in our routine autopsy examination. Our only case was one of subclavian aneurysm in which the lesions of the artery wall were identical with those of the syphilitic mesaortitis present. In a few instances the examination of external and internal carotids has shown the presence of typical infiltrations in media and adventitia, although no spirochetes have been demonstrated. In three cases of tertiary syphilis of the tonsils the small arterial branches showed extensive perivascular infiltrations and thickening of the artery wall. Spirochetes were demonstrated in these in great numbers.

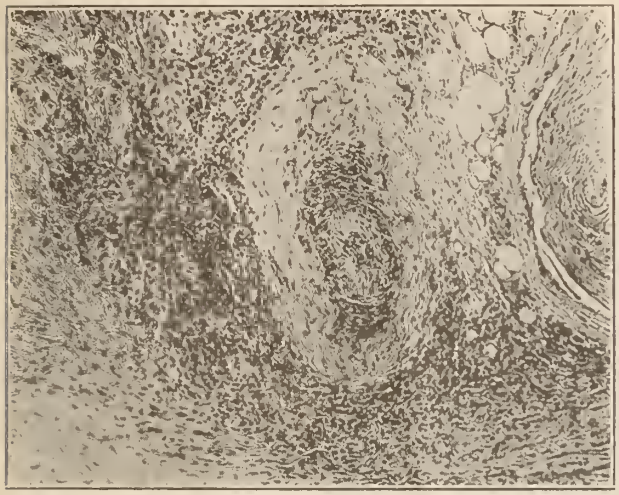

Fig. 3.—Active syphilis of arteries of foot. Small artery with narrowing of lumen, sclerosis of media, and marked perivascular infiltration. From case of symmetrical gangrene, simulating Raynaud's disease.

Syphilis of the small arteries of the meninges, brain and cord is found in every case of tabes and paresis and cerebrospinal syphilis, while scattered lesions may be found in the brain in most cases of late syphilis. The most common form of the disease is a periarteritis; in more active cases it appears as a panarteritis of obliterating endarteritis. The gummatous form is much more rare. In the neighborhood of cerebral gummata the arterial lesions are usually very marked and characteristic. The vessels become concentrically thickened through proliferation, the lumen narrowed or obliterated by fibroblastic tissue with a new formation of capillaries in the new tissue filling up the lumen. Such vessels may become sclerosed and hyaline throughout; and the relationship of syphilitic disease of the smaller arteries to total sclerosis of the vessel is better seen in the central nervous system than elsewhere. The picture is entirely different from that presented by ordinary arteriosclerosis beginning in the intima. With the dying out of spirochetes and the healing of the lesion the entire thickened wall becomes hyaline, producing the "macaroni tube" appearance. This is seen in the most marked degree in the meningeal arterioles of the spinal cord in cases of old tabes.

Syphilis of the coronary arteries, in our experience, has been found much less frequently than anticipated from its frequent mention in the literature. Although myocardial lesions occur in practically every case of late syphilis, these are interstitial infiltrations and proliferations along the smallest capillaries between the heart muscle fibres; and the larger branches of the coronaries only rarely show active lesions that can be recognized as syphilitic. In every case in our experience these have been of the nature of an arteritis with obliterating proliferation of the intima, often associated with thrombosis. Secondary atherosclerotic changes may follow the healing of these lesions, as elsewhere, but the syphilitic nature of the process can only be recognized in the active stage.

In one case of pemphigus coming to autopsy extensive sclerosis and obliteration of the cutaneous and subcutaneous arteries were found, in association with syphilis of the aorta and larger arteries. Local syphilitic lesions of the arteries of the skin and subcutaneous tissues are seen in the neighborhood of chronic syphilitic ulcers and gummata of chronic syphilitic ulcers and gummata of the skin.

The most common localization of syphilis of small arteries is in the small arteries of the vasa vasorum of the aorta, and of the prevertebral, paraaortic and mesenteric arterial branches. Every case of late syphilis in the male shows syphilitic mesaortitis of some degree. This may be so slight as to be unrecognized in the gross appearances of the aorta. The early aortic disease may produce no gross changes in the intima at all, although the perivascular infiltrations microscopically may be extensive. Such syphilitic localizations around the vasa vasorum of the aorta have been found in cases of syphilis as early as eighteen months after the initial lesion, although the aorta in these cases appeared normal to the naked eye. The secondary degeneration of the intima with resulting fibrosis and sclerosis is apparently of very slow development, and undoubtedly depends upon a slow infarction or disturbance of nutrition caused by the ultimate narrowing or obliteration of the vasa. Aortic syphilis in the adult is essentially a disease of the vasa vasorum, and the circulatory disturbance is responsible for the changes in intima and media. Only in early congenital syphilis have we seen a direct localization of spirochetes upon the intima, with local degeneration and proliferation.

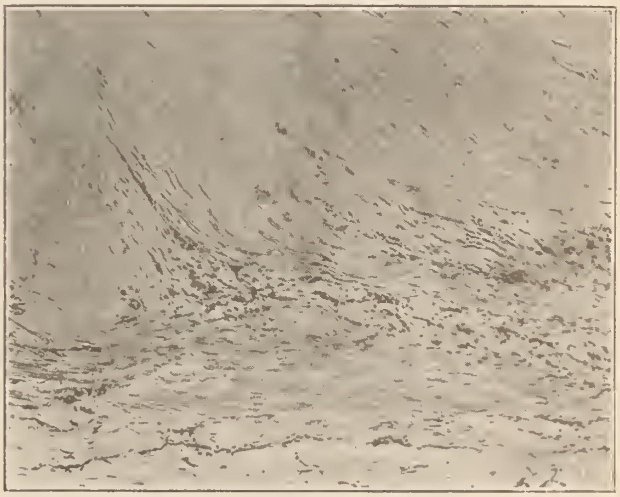

Fig. 4.—Syphilis of large coronary branch. Marked sclerosis of media with plasma cell infiltration around obliterated vasa vasorum.

The changes in the aortic vasa vasorum vary much in degree, from a few plasma cells about the vessel to extensive perivascular infiltrations, and from a slight proliferation of the wall of the arteriole to a marked concentric cellular thickening obliterating the lumen, and producing an appearance often mistaken for miliary gumma. In single sections these concentrically thickened arterioles often broadly resemble miliary epithelioid tubercles. In the centre of the whorl of cells the reduced lumen can usually be made out, and there is often a new formation of capillaries within the whorl. In old and severe cases the new formation of vessels in the outer portion of the media and in the adventitia is often very marked, the new vessels in turn showing perivascular infiltrations and obliterative thickening of the arterioles, but often angiectasia of the venous capillaries.

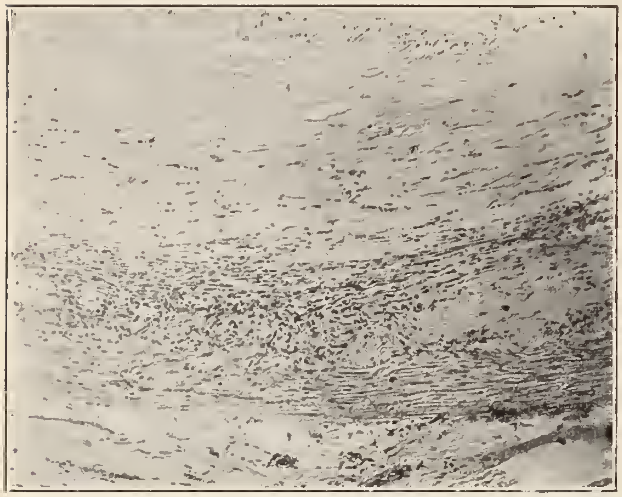

Fig. 5.—Syphilitic atherosclerosis of small artery. Atherosclerosis of intima and inner portion of media. Plasma cell infiltration of outer portion of media.

With the local disappearance of spirochetes the affected arterioles show a general fibrosis of the wall and secondary hyaline change. Such a sclerosis begins as often at the periphery of the vessel as in the intima, so that a perivascular sclerosis is a very common sequel to healed vascular syphilis. In the medium sized arteries the two types of sclerosis, the simple intimal form and the syphilitic, often overlap and are combined; and it is impossible to state in old cases how much of the arteriosclerosis is due to syphilis or to other causes. The frequent coincidence of the two processes complicates greatly the whole problem of determining even approximately the importance of syphilis in the production of arteriosclerosis.

Syphilitic vascular lesions similar to the aortic are very frequent in the smaller branches of the mesenteric artery and in the periadrenal tissues. In some cases the only evidences of active syphilis in the body, outside of the heart and aorta, are found in the vessels of this region, in the form of small perivascular collections of plasma cells. The vessels themselves show greater or less thickening of the wall.

Syphilis also at times localizes markedly in the gastric and duodenal smaller arterial branches, and it is an undoubted factor in the production of peptic ulcer. In such cases the vascular changes and the resulting ulcer are exactly comparable to the perforating ulcer of the foot, in so far as the essential pathology is concerned. The gastric arteries at the site of the ulcer present an obliterating endarteritis or panarteritis, while the smaller arterial branches show perivascular infiltrations of plasma cells. In the more recent cases the active reaction is marked and characteristic; in the more chronic cases, with healing, the sclerotic changes in the vessels predominate. We have had three cases of syphilitic peptic ulcer of the stomach. In one of these, from Dr. Cabot's service, the syphilitic vascular disease was very pronounced, and the neighboring lymph nodes showed active syphilitic lesions. Spirochetes were found in numbers, both in the perivascular infiltrations of the stomach wall and in the lymph nodes.

Syphilitic lesions in the walls of the pulmonary artery and branches are not uncommon. Only rarely are they severe enough to take part in the production of clinical conditions. As a rule they are slight and form a part of the general picture of latent syphilis. In the large branches the lesions are identical with those in the aorta, a mesarteritis with disease of the vasa vasorum. In the smaller branches perivascular infiltrations and thickenings leading to a more or less marked sclerosis of the entire vessel wall and narrowing, sometimes dilatation of the lumen characterizes the process. It is increasingly difficult here to differentiate sclerotic changes due to syphilis from those due to chronic congestion. The latter condition is practically always associated with old syphilis. In a few cases the syphilitic lesions of the pulmonary arterial system leads to the development of aneurysm or to obliteration of the smaller branches with chronic cyanosis, polycythemia and splenomegaly (Ayerza's disease).

In every organ and tissue the seat of active syphilitic localizations the arteries show more or less pronounced syphilitic lesions (liver, pancreas, adrenals, testes, etc.). These lesions are essentially the same as described above.

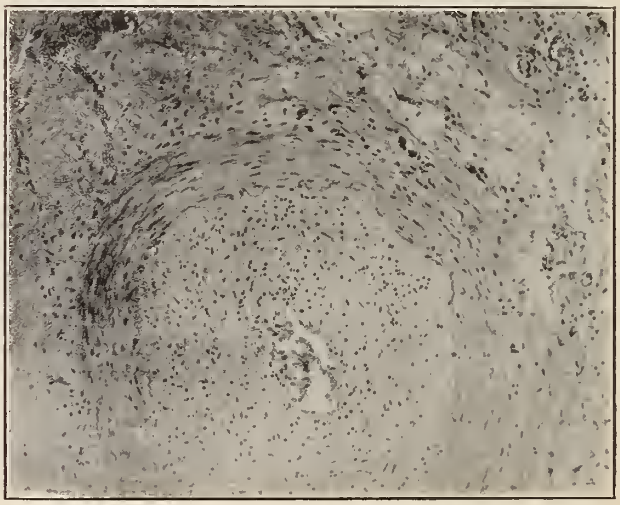

Fig. 6.—Syphilitic endarteritis obliterans of small artery.

3. THROMBOARTERITIS OBLITERANS.

This may be syphilitic in origin, but it is more frequently produced by other infections. Thrombosis of the smaller arteries is not often associated with active syphilis of the vessel. The proliferating endarteritis of syphilis in the majority of cases occurs without associated thrombosis. We have seen syphilitic thromboarteritis in cerebral and coronary arteries, the aorta, mesenteric branches, and large arteries of lower extremities.

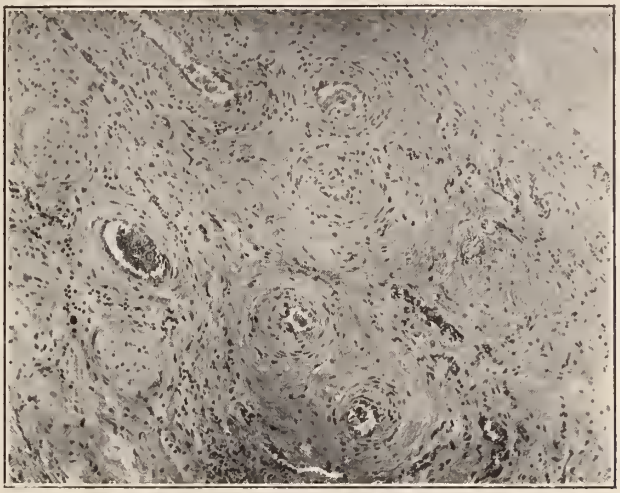

Fig. 7.—Syphilitic perivascular sclerosis and obliteration of small arterioles in periadrenal plexus.

4. PERIARTERITIS NODOSA.

We have seen material from one case associated with widespread active syphilitic lesions, and another case without such association. The syphilitic nature of this affection upheld by Versé is combatted by other writers. Our experience to date throws no light on this problem.

CONCLUSIONS.

Simple arteriosclerosis (hyaline thickening of the intima) of the medium and smaller arteries is more common in syphilitics than in nonsyphilitics. It is probably not due to the localization of spirochetes in the intima, but is of secondary origin (toxic or mechanical). Syphilitic periarteritis, panarteritis and arteritis obliterans of the smaller arteries occur in all cases of chronic and latent syphilis, in greater or less degree. Syphilitic mesaortitis is essentially a disease of the arterial vasa vasorum. Syphilitic lesions of the smaller arteries are always associated with localization of the infection in any organ or tissue. The lesions are rarely gummatous in character.

Syphilitic mesarteritis occurs in the carotids, subclavians, iliacs, femorals, tibial and pulmonary arteries. It is usually of slight degree, and is found only on microscopical examination. Occasionally it expresses itself clinically as aneurysm of these arteries, or in circulatory disturbances due to obstruction of the arterial lumen. Syphilitic obliteration of the pulmonary arteries may lead to the production of Ayerza's disease (chronic cyanosis, polycythemia and splenomegaly). Clinical syphilis of the peripheral arteries of the extremities is more common in the legs and feet, manifesting itself in gangrene, perforating ulcer, sclerosing atrophy, or symmetrical gangrene simulating Raynaud's disease. Little is known of the occurrence of syphilitic lesions in the arteries of the arms.

Syphilitic arteritis may be a cause of peptic ulcer, or pemphigus, localized ulcers, atrophy and various forms of dystrophy, due to disturbed circulation, as the result of partial or complete obstruction of the lumen of the affected artery. Syphilis of the smaller arteries and arterioles plays a very important part in paresis, tabes and cerebrospinal syphilis, and in the production of localized degenerations of brain and cord. Syphilis of the coronary arteries is also of clinical importance.

In general, it may be stated that localized syphilis of the smallest arterioles is an essential part of the general pathology of chronic or latent syphilis.

REFERENCES.

1. Ophüls: *Arteriosclerosis and Cardiovascular Disease: Their Relation to Infectious Diseases*, Stanford University Publications, 1921.

Etiology and Treatment of High Blood Pressure, Arterial Hypertension, and Arteriosclerosis*

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I have had considerable to say on these subjects in previous articles (1, 2, 3, 4, 5 and 6) but there is need of further treatment. Inasmuch as discussion, point by point, is an excellent method of arriving at an understanding of the truth, I wish you to permit me to set forth a discussion of three articles that have recently appeared and that represent the more recently accepted ideas; and in this discussion I beg you not to imagine that I am making criticisms just for the sake of carping, but rather comprehend that I am doing hard constructive thinking, using ideas that I have acquired by many years of continued closely applied scientific scrutiny in order to solve some of the most difficult, the most prevalent, the most misunderstood, and the most crying problems in medical science. I am exerting myself for the good of all ailing human beings and of all who try to practise scientific medicine. To cease thinking and to agree with everybody about everything may be an easy way of obtaining popular approval, but what is the real value of such existence to anybody except fakers and quacks? When affective diseases are properly understood and treated there will be much less patronage going to pseudoscientific practitioners. I shall designate the articles to be discussed by A, B, and C. It is doubly advisable, and indeed obligatory, to take up this discussion because the authors of these three articles were all aware of the existence of my pertinent articles before their articles were read or published.

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*Read before the Medical Society of the County of Herkimer, Herkimer, N. Y., September 6, 1921.

While conducting this discussion let us keep in mind what we have learned of normal psychology and what we have learned of pathological psychology in some of my former articles (1, 2, 3, 4, 5). The fact with which we are chiefly concerned here is that certain emotions (or rather affective (2) activities) which I have denominated violent (and also currents arising from irritated sympathetic ganglia) pass over the fibres of the thoracolumbar (sympathetic) nervous system and cause increased frequency, increased tonicity, increased force of contractions of the heart, and contraction of the arteries, capillaries, and veins and that these activities occur characteristically in sthenic (2) neurasthenia (2).

I wish to call attention to the proper and necessary distinction which I make between high blood pressure and high arterial tension or hypertension. These terms are used interchangeably in medical literature to indicate high blood pressure. However, I hold that there is a distinct difference between them and that high arterial tension may and often does exist without high blood pressure (and also that high blood pressure occurs sometimes with dilated arteries). High arterial tension or arterial hypertension or just hypertension should and obviously must mean high tension of the arteries themselves, that is, of the arterial walls through the activity of their own musculature, that is, a condition in which the arterial walls are more contracted than they normally are, the caliber of the arteries being therefore reduced. No truly scientific discussion of the subjects of this paper and of the three other articles can be conducted without this fundamental distinction.

Articles A and B were written by eminent physicians and were published together in an August journal. They were apparently read at the same medical meeting in May of this year (1921). We will begin the consideration of Article A by the following quotation from it: "Theoretically blood pressure is increased by the following factors: a, A decrease in the size of the peripheral blood bed; b, an increase in the cardiac output; c, an increase in the total volume of blood; d, an increase in the viscosity of the blood. At the present time most observers consider, a, that is, a decrease in the peripheral blood bed, as the most important factor in causing hypertension, while a relatively few observers regard c, namely, an increase in the total volume of the blood, as the chief factor. Very little stress today is put upon b and d as important factors in bringing about hypertension."

The author first considers c, an increase in the total volume of blood as a cause of high blood pressure, but, as I agree with his conclusion that excessive intake of fluid and increase in sodium chloride content of the blood are not significant factors in determining blood pressure, I will not discuss it. d, An increase in the viscosity of the blood is a very small factor in blood pressure and as he does not discuss it I will pass it by. Although he says that very little stress is put today upon b, an increase in the cardiac output, I shall have considerable to say about it later.

Our author states that the more generally held view today is, a, that increase in blood pressure results from a decrease in the size of the peripheral blood bed and that the peripheral blood bed may be decreased in size "by 1, a functional vasoconstriction (spasmodic contraction) of the vessel walls, 2, by an organic lesion of the vessels which narrows their lumen, and 3, by an organic lesion of the vessel wall which interferes with a compensatory dilatation such as takes place under normal conditions when local vascular constriction is brought about to decrease the blood supply to a given organ.

"All observers who hold to the view that the size of the peripheral blood bed is the cause of hypertension (high blood pressure) consider that the change takes place in the small and not in the large vessels."

This conclusion stated in the last sentence is reached by the following reasoning: Arteriosclerosis, by which term these observers mean demonstrable thickening and other changes in the bloodvessels accessible to examination, may exist without there being any increase in the blood pressure and increase in blood pressure sometimes exists without arteriosclerosis, and there seems to be no necessary causal relation between arteriosclerosis of these larger vessels and high blood pressure, while on the other hand in some cases, in which there is hypertension (high blood pressure) during life, pathological examination has shown thickening and other changes in the small bloodvessels.

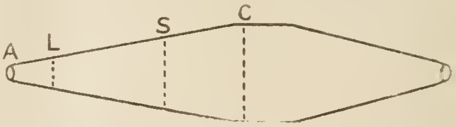

Fig. 1. Graphic representation of blood bed.

Now let us interrupt the further presentation of the theories which attempt to show that decrease in the blood bed, particularly in the peripheral arterial blood bed, is the main cause of high blood pressure and let us consider whether such a thing is physically possible.

According to an evident truth of physiology, the blood path or bed gradually increases from the aorta through the larger, then through the smaller, arteries and becomes greatest in the wide aggregate expansion of the capillaries and then gradually decreases from the capillaries and numerous small veins through the larger veins and becomes small again in the venæ cavæ. The blood bed may be graphically represented as two funnels placed large ends together as indicated in Fig. 1.

The blood bed at the aorta is represented by a transverse section at A, at the level of the aggregate large arteries by a transverse section at L, at the level of the aggregate small arteries by S, and at the level of the aggregate capillaries by C. Now the theory we are investigating asserts that the increase in blood pressure in the large arteries at L (as in the brachial and radial) is caused by a decrease in the aggregate calibre of the small arteries at S. If in such manner the pressure at L should be much increased it would be necessary for S to be contracted to about the size of L which doubtless never occurs. Although the pressure at L would be somewhat increased by diminution at S, it should be evident that the decrease at S cannot be so very great as to cause much increase of pressure at L.

The conclusion just stated is the only logical one whatever may be the supposed cause of the possible narrowing in the small arteries. However, the author continues with the theory. He considers that nephritis or any toxic substances connected with nephritis could not alone cause this narrowing in the peripheral blood bed. But he considers that some other element may act with the toxin of nephritis to cause this contraction in the peripheral arterial blood bed and he first mentions spasm of the peripheral arteries as such an accessory cause, but this suggestion is weak for the following reasons: he does not ascribe a cause for the spasm of the small arteries but seems to assume that the spasm simply takes place without any particular cause, and secondly, he does not show that any such spasm occurs in the small arteries without a like spasm of the large arteries. I hold that when there is spasm of the small arteries there is usually spasm of the large arteries at the same time and that the contraction of all arteries, large and small (and in fact of all bloodvessels) is caused by currents of violent affectivity from the brain or currents arising from an already irritated thoracolumbar (sympathetic) division of the autonomic nervous system. This contraction of the bloodvessels, particularly of both the large and small arteries, is one of the most important and also one of the least known things in all medical practice. But, in connection with the problem we are now studying, this contraction of all the arteries (or of all the bloodvessels) is only a secondary and an unimportant cause of increase in blood pressure for the reason that, even while this contraction of the vessels exists, there still exists a gradual increase in the aggregate blood bed all the way from the aorta to the capillaries.

Another cause for contraction of peripheral arteries which is accessory to nephritis the author says may be some changes in the glands of internal secretion but again I hold, as is demonstrable by actual practice with the educated finger, that thyroid secretion and lack of ovarian activity affect the large as well as the small arteries and that their contraction is only a secondary and unimportant cause of high blood pressure.

Our author says: "It needs to be recognized, I think, that infections of various kinds may lead to vascular lesions and that these probably play a part in hypertension" (high blood pressure). But he does not show nor indicate pathological evidence to indicate how such lesions in the small arteries could cause high blood pressure. In the aggregate of the which could possibly cause occlusion sufficient materially to decrease their blood bed and thus increase blood pressure.

Our author further says: "It is very evident that nervous excitement can increase blood pressure, and it is probable that continuous nervous excitement, business strain, etc., may be an important factor in hypertension" (high blood pressure). Now he is getting just a little warm but he misses the main facts in causation. Why does he not say that, according to my ideas, violent affective activity tightens the arteries, both large and small, such contraction being a secondary cause of high blood pressure.

The next sentence of this article presents his last possible cause for peripheral arterial contraction: "Perhaps in some cases there is some sort of primary disturbance in the bloodvessels themelves which leads to hypertension" (high blood pressure). Such a statement is, of course, so indefinite that it cannot be discussed.

He concludes: "The causes of hypertension (high blood pressure) are probably multiple" and "in final analysis the most probable mechanism of hypertension (high blood pressure) is a narrowing of the peripheral blood bed," which conclusions we have seen are untenable.

Now what is really the great chief cause of high blood pressure? Suppose that you were pumping water through a long piece of elastic rubber tubing, would there be any doubt that the essential force sending water through the tubing is the force of the pump—as imparted to it by your muscles? There is no more doubt that the force of the contractions of the heart is the chief cause of blood pressure whether that blood pressure is high or low; and, with regard to a rise of blood pressure over that usually prevailing in human beings, the great chief cause of increase in the force of the cardiac contractions and therefore of increase in blood pressure is violent affective activity and the irritable condition of the thoracolumbar division of the autonomic nervous system which is induced by these currents of violent affective activity or by some weakening disease.

Of course, when the arteries are contracted more than normally they are more easily filled by the heart beats and therefore blood pressure is somewhat raised; but the changes in calibre of the arteries, both large and small, through the action on their musculature of affective activity (pathetic affectivity causing relaxation and violent affectivity causing contraction) are, on account of the wide increasing blood bed as already stated, secondary factors in determining blood pressure. The chief bearing that a decrease in the calibre of the arteries has on blood pressure is that when the arteries are contracted they are not only more easily filled but also become, on account of the greater tonicity of their musculature, more rigid, less easily stretched, and consequently the systolic and diastolic readings are nearer together, that is, the pulse pressure is smaller. Furthermore, undue contraction of the arteries often tends to diminish the activity of the heart muscle and thus really to lower blood pressure. To prove the truth of the statements in this paragraph, study actual cases and, if you wish, select a patient having contracted arteries and observe the diameter of the artery with the finger and the blood pressure with an instrument before and after a dose of nitroglycerine.

But if pathetic emotions cause relaxation of the arteries and of the heart and a slowing of the heart beat how is it possible for high blood pressure to exist with dilated arteries? Such cases are not at all infrequent and sometimes have very high blood pressure. This is one of the pathologicopsychologicomedical problems over which I was most puzzled. If you will study these cases most minutely you will find that, as occurs not at all infrequently in affective disturbances, there is active in them a strong current both of pathetic and of violent affectivity, the latter driving the heart to increased, sometimes to enormous, activity, and the former relaxing the arteries. I thought earlier in my study of these cases that the arteries were merely stretched by the great force of the heart. However, the heart beat, no matter how powerful, is never able thus to stretch an artery of normal or decreased calibre, although an hypertrophied or affectively stimulated heart doubtless does more or less stretch arteries that are affectively relaxed. (Parenthetically I may remark that hypertrophy of the heart is often caused by affective activity,—a fact I have never heard of from other medical authors.)

We will now discuss what is said in article B about hypertension by which term its author always means high blood pressure.

He states in regard to transient hypertension (high blood pressure) that it is evidence of nervous instability but why does he not refer it back to its ultimate cause, violent affectivity? (He says he once observed a fall of systolic pressure of 50 mm. during examination with the sphygmomanometer. Of course, this fall was due to transient pathetic affectivity.)

As article B deals primarily with the treatment of high blood pressure, the causes of high blood pressure are in some instances indicated by implication, which is more or less plain.

The author says: "All forms of toxemia should be controlled. Metallic poisons, such as lead, should be avoided. Drug poisons, as alcohol and tobacco, are to be used moderately if at all. Focal infections are to be cured. Syphilis, if present, must receive vigorous treatment." Although chronic lead poisoning is known to cause contraction of the arteries it cannot materially raise blood pressure by such action, as we have already seen. Nicotine may in a few cases have a similar action. Alcohol is a vasodilator. Some focal infections apparently, directly or indirectly, cause vasoconstriction and may consequently, as we have seen, only slightly raise blood pressure. Vasoconstriction is often seen in syphilitics (4) but since violent affectivity arising from the patients' fright causes so much vasoconstriction it is not certain and not probable that the syphilitic infection itself increases this constriction.

He further states that perhaps the most difficult causes of high blood pressure to treat are "metabolic errors" under which head he places the regulation of the intake of food and drink, of the motility and evacuations of the bowels, of the amount and quality of the urine, of the patient's work, play, and sleep, and of his mental burdens. We will consider these points separately.

I do not see that the food and drink intake has any particular influence in causing high blood pressure except chiefly in so far as there may be occasionally connected with these things a disturbing mental element, violent affectivity stimulating the heart and arteries. It is this mental element which appears when a housewife tries to eat her own meals and at the same time wait on the table. Insufficient chewing and insufficient mixture of saliva with food could not, except through possible discomfort resulting, produce any rise in blood pressure. Although there is a normal tendency for blood pressure to rise very slightly after meals as a result of general heightening of vegetative functioning, I do not believe that the habitual eating of a liberal quantity of food is an essential cause of high blood pressure.

I may here mention a related point, which, however, is not mentioned in these three articles. I am occasionally asked why high blood pressure so frequently occurs in fat people. When people are already fat or become fat the heart has greater work to do because it must pump blood through all this additional fatty tissue and it, as it usually does when it has to perform more work, hypertrophies and therefore actually pumps more blood and thereby raises blood pressure. Furthermore, fat people stimulate their hearts also by the greater voluntary effort which they, on account of their greater weight, have to make in order to move about and to work.

Exercise, by the way, is one of the causes presented by our author for high blood pressure and it may be said here that in general the greater and more continuous the work or physical exercise the greater will be the hypertrophy of the heart and the higher will be the blood pressure, but of course rest and fatigue are usually sufficient to prevent any excessive hypertrophy.

Furthermore, in studying the effects of exercise on blood pressure it must be borne in mind that affectivity is a usual accompaniment of exercise and that the effects of this affectivity on blood pressure must not be mistaken for the effects of the exercise. It is difficult to make this differentiation.

Resuming our discussion of the things which our author believes to be causes of high blood pressure we reach his mention of intestinal autointoxication, constipation, fermentation and putrefaction, intestinal stasis, and proteid food. This is the old line of things which should have been dropped from consideration long ago for there is no truth in them. They, especially intestinal autointoxication, have been long enough the palladium by which scientific ignorance on all sorts of medical things has been concealed.

In regard to the amount and quality of urine we need only to recall that in discussing article A it was concluded that the fluid intake and the presence of renal toxins were not primarily important causes of high blood pressure. (Excessive fluid is quickly eliminated by the kidneys as can be easily observed both by collecting the urine and comparing specific gravity before and after drinking large quantities of fluid.)

We finally come to the author's consideration of mental burdens, stress, imaginary troubles, real cares, and anxiety, but again, as when on former occasions such mental things have been mentioned, the author does not analyze these mental phenomena into their cognitive and affective elements and therefore cannot see or describe the affective activities which are the essential disturbing factors. Mere ideas do not disturb the function of organs, but the affective activities which accompany some ideas do disturb the functions of organs. Ideas and their accompanying affectivity constitute emotions (1, 2).

The menopause, the last cause of high blood pressure mentioned by this author, is in some women for a longer or shorter time marked by tight arteries and their accompanying temporary and only secondary rise in blood pressure.

Article C is a monograph of 102 pages on Arteriosclerosis and Cardiovascular Disease published (1921) and written by its eminent professor of pathology. It is largely a study of the causes of arteriosclerosis.

In former articles (1, 2, 4, 5) I stated that I consider that arteriosclerosis is caused by undue dilatation or contraction of the arterial walls, dilatation being caused by pathetic affectivity and contraction by violent affectivity or an irritated condition of the thoracolumbar (sympathetic) nervous system. I stated that during this excessive contraction or dilatation the tissues of the walls are thereby cut off from their full amount of needed nutrition and that they necessarily in time become degenerated and replacement fibrosis takes place.

(*To be concluded.*)

The Place of Electrocardiography

By LOUIS FAUGERES BISHOP, A. M., M. D., Sc. D., F. A. C. P.,
New York,
President of the Good Samaritan Dispensary, and Physician to the Lincoln Hospital.

It is necessary to be absolutely familiar with the electrocardiogram before its true significance becomes a matter of habitual interpretation. The old belief of the medical profession that there is a sharp and definite line between the normal and the pathological heart is a great stumbling block in the progress of electrocardiography. An elaborate symposium on this subject was held at the New York Academy of Medicine on the evening of December 13th. This meeting was opened by Dr. William Sidney Thayer, of Baltimore, and continued by a number of prominent internists. Dr. Thayer's paper on the Minimum Symptoms and Signs Necessary to Make a Diagnosis of Organic Heart Disease was wonderfully pleasing and illuminating, and the speakers who followed him were all interesting, each according to his own particular interpretation of cardiac philosophy. However, at the end of a long and delightful evening, the matter of what constitutes organic heart disease remained exactly where it was at the beginning of the discussion.

I have not used the terms organic heart disease and functional heart disease for a long time. It appears to me that all diseases start with the disturbance of function, and organic changes probably exist as a temporary factor in the very beginning of any serious disorder, and, when at the very end there is a profound change of structure, it is only the end results of functional disorder. If there is any truth whatsoever in this statement, how in the name of heaven can we know where organic disease begins? This may seem like a digression, but it has a profound bearing on the study of electrocardiology.

Every heart is different from every other heart, and just so each electrocardiogram is different from every other electrocardiogram. Their significance depends entirely upon their being a part of the whole picture. As such, they are a modifying factor in the appraisal of each heart, whether regular or irregular. People no longer come for the diagnosis of heart disease. They come because the diagnosis of heart disease has been made and they require an appraisal of their hearts. This appraisal gives the opportunity for an interesting analogy. If you should pay some good real estate firm for an appraisal on your house, they would look up all their records pertaining to your property, but they would not be satisfied until they had sent an expert to look over the property. If a title was involved, they would have the property surveyed. In the same way, before an appraisal of the heart is complete, it is necessary to look at the heart with the fluoroscope and to observe the heart beat as shown in the electrocardiogram.

It is perfectly absurd to hand a man an electrocardiogram of an unknown person and ask him whether the heart is normal or abnormal. The electrocardiogram of youth is perfectly abnormal in old age, and the electrocardiogram of old age is not that of middle life. It is also fair to give any facts which bear on electrocardiology, such as amputation of the left hip or marked curvature of the spine. In a large proportion of appraisals of hearts the electrocardiogram furnishes the additional factor which makes the whole result correct and complete.

It is not so much a knowledge of the technicalities of the electrocardiogram that is lacking in the medical profession of today, for a great many men have taken pains to learn them, but it is failure to appreciate the electrocardiogram as bearing upon everyday problems in cardiology.

For these reasons it is fair to advocate the routine use of electrocardiography, so that every one may have the opportunity to study the necessary number of electrocardiograms in direct connection with the people involved. The new field that opens makes it necessary to create new categories in the classification of hearts, for instance, the group of the infantile heart, which I have described elsewhere.

109 East Sixty-first Street.

Death of the Heart in Diphtheria

By S. CALVIN SMITH, M.S., M.D.,
Philadelphia.

INTRODUCTION.

While conducting a series of clinical and graphic investigations of the heart in diphtheria at the Philadelphia Hospital for Contagious Diseases during the summer of 1920, an unusual case was encountered which merits a separate report.[1] So far as I know, the records are unique in showing the events which can transpire in a heart overwhelmed by toxins, even after clinical death has been pronounced. The following points are illustrated in the graphic records:

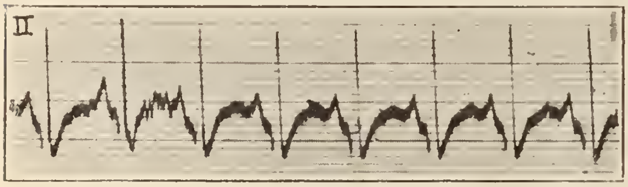

FIG. 1. On admission. Time, 1:10 p. m.; rate, 150.

1. The administration of diphtheria antitoxin has a stimulating effect upon the toxic heart. Even in a moribund patient in whom diphtheria had been unrecognized and untreated for seven days, antitoxin increased the rate and caused the heart to respond with what was apparently an increase in the strength of the contraction impulse.

2. Ventricular fibrillation is not so instantaneously followed by death as has been generally believed. The heart herein recorded showed activity for five minutes following the inception of ventricular fibrillation.

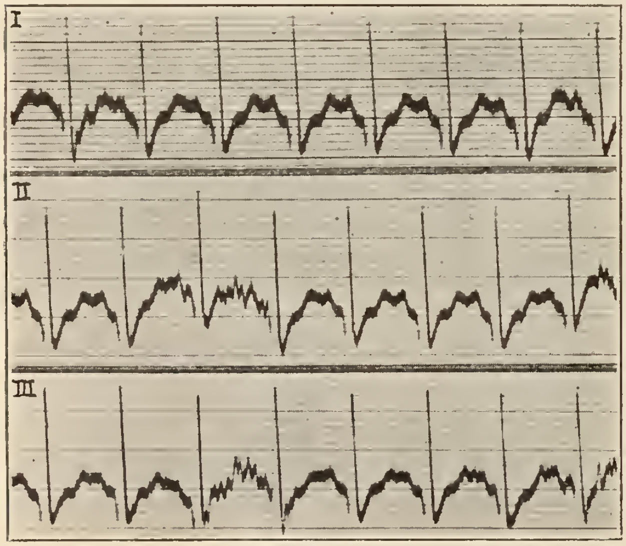

FIG. 2.—1:20 p. m.; rate, 150. Despite their amazing similarity, the three leads were taken in the order named.

3. The toxic heart may adopt a variety of irregularities. It does not adopt one definite type of abnormal mechanism and necessarily confine itself to that single type indefinitely. Within twenty-six minutes the heart here reported showed four abnormal mechanisms, passing from a period of tachycardia (Fig. 4) into a brief interval of what is probably ventricular flutter (Fig. 5 A), which lasted for four and six tenths seconds; ventricular flutter was rapidly succeeded by a period of ventricular fibrillation (Fig. 5 B), the duration of which was approximately two minutes. There then ensued a period of complete atrioventricular heart block, in which the ventricular impulse gradually declined in amplitude until, in the succeeding minute, ventricular activity ceased altogether and auricular activity alone was manifest. This auricular activity (Fig. 7) occurred at regular intervals which gradually lengthened during the succeeding one and a half minutes as the heart advanced to death. Two feeble auricular impulses, separated from each other by one and four tenths seconds, were followed by eternal silence.

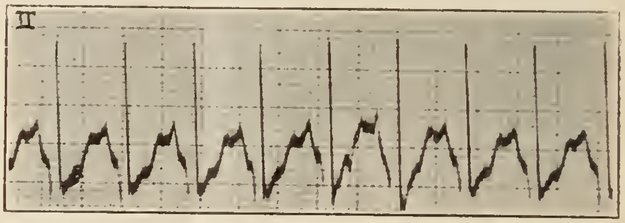

FIG. 3. During intravenous injection of 15,000 units of diphtheria antitoxin, at 1:25 p. m.; rate, 165.

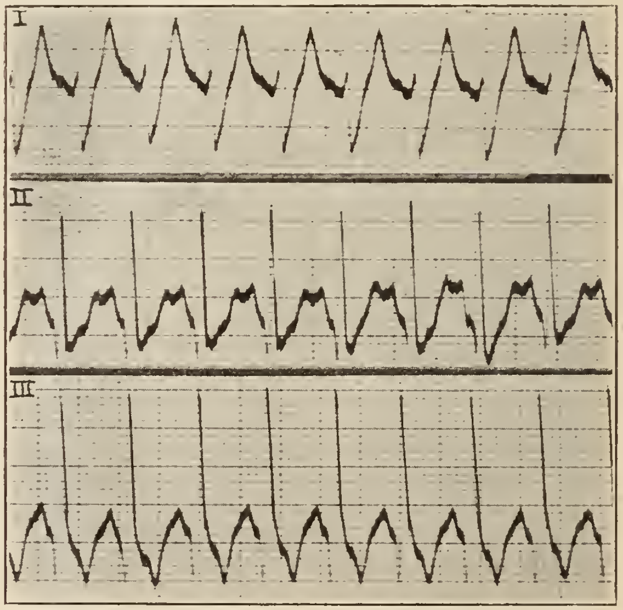

FIG. 4.—1:42 p. m.; rate, 180. Right ventricular preponderance and profound myocardial disturbance are evidenced in these records.

SYNOPSIS OF CASE HISTORY.

Previous history.—F. B., a white child, four years old, and of American parentage, was one of a family of four. She was a normally born, full term, breast fed infant who had always been strong and robust, except for mild attacks of measles and of whooping cough at the age of two, both of which were uncomplicated and of brief duration.

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[1] Other cases of this series were reported under the caption "Observations on the Heart in Diphtheria" at the Boston Session of the American Medical Association, Section in Medicine, June 10, 1921.

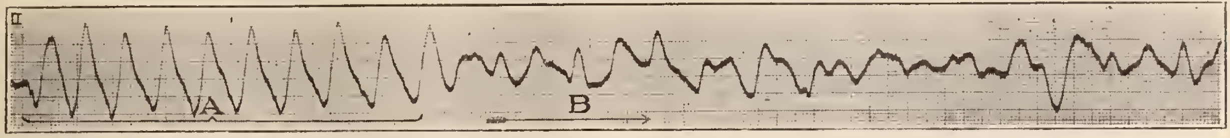

Fig. 5.—Clinical death pronounced at 2:05 p. m. by four competent observers. At the same instant there ensued a brief period of ventricular flutter A, followed during the next two minutes by ventricular fibrillation B, which gradually eventuated in the heart block of the following record. Illustration reduced.

Present illness.—On May 17, 1920, the child complained of muscular pains and of sore throat and had a fever. A physician was called the following day. The diphtheritic membrane was not observed until seven days later, at which time the patient was rushed to the hospital.

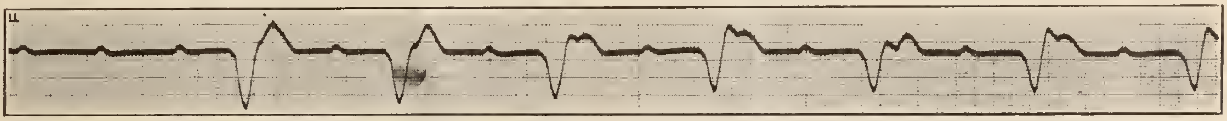

Fig. 6.—2:08 p. m. Heart block. Note the three auricular impulses at the beginning of the record and the absence of any ventricular response thereto. Farther on the auricles retain their rhythmic activity at the rate of seventy-five impulses a minute, every other wave being buried in an enormous ventricular complex. The rate of the ventricular impulse is thirty-seven. Further note the decrease in the amplitude of the ventricular complex as it advances towards the ventricular silence of the following records. Illustration reduced.

Condition on admission.—May 23d, at 1.10 p. m. A well nourished, markedly cyanosed, extremely toxic child of four years, was found to have faucial, tonsillar and nasal diphtheria. The pulse was regular and of low volume; the rate was 140. The maximum cardiac impulse was not demonstrable, nor could the heart borders be satisfactorily outlined by percussion. The heart sounds were of a distant, booming quality and the valvular element of the sound was lacking.

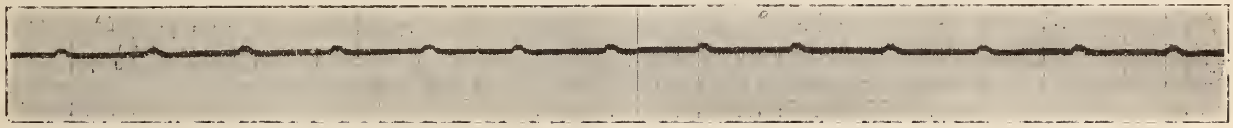

Fig. 7.—2:09 p. m. Auricular activity continues, but the ventricular impulse is silent. Rate 65, gradually decreasing as the record proceeds. Illustration reduced.

Treatment and subsequent course.—Fifteen thousand units of diphtheria antitoxin were administered at 1.25 p. m. The general appearance of the child improved, the pulse rate increased, the precordial impulse could then be felt and the heart sounds improved in quality. The cardiac reaction, however, was not long sustained; within fifteen minutes the patient began to sink and death was pronounced at 2.05 p. m. by the physicians and nurses in attendance.

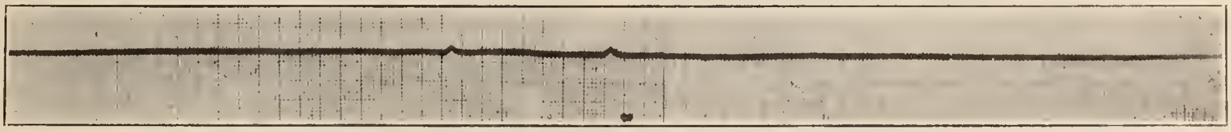

Fig. 8.—2:10½ p. m. Death of the heart. Illustration reduced.

COMMENT.

1. It would be erroneous to conclude from the studies herewith presented that diphtheria, when it affects the heart, affects all hearts in the manner recorded. As the result of observations in similar cases, I am of the opinion that this is the likely manner of heart death in neglected and untreated cases of diphtheria. It is not, however, the manner of death in those cases of sudden heart failure which burst from a clear sky, as so often happens between the sixth and eighth day of diphtheria convalescence, despite early antitoxin treatment and watchful heart care. In such instances there is a surprisingly sudden onset of heart block, the preexisting rate being reduced one half or one third within a few minutes. The heart block of convalescence is usually maintained, undisturbed by the substitution of any other type irregularity, and generally progresses in severity; death therefrom may be expected within twenty-four or thirty-six hours.

2. It is not uncommon, as far as my observations go, for the toxic heart to manifest a variety of abnormal mechanisms during the progress of those severe infections which acutely disturb the heart. On the other hand, in chronic heart affections where there is structural alteration in heart tissue, such kaleidoscopic changes do not seem to occur; a given form of abnormal mechanism, once adopted, is likely to be perpetuated. These observations bring up the question as to whether corrective cardiac drugs should be administered immediately upon the detec-

tion of abnormal mechanisms, especially in acute affections of the heart. Certainly it untreated fibrillation is followed by heart block, the prescribing of massive doses of digitalis for the fibrillation would in all likelihood make the block infinitely worse and, perhaps, would precipitate death. It is logical, therefore, to adopt the premise that the mere detection of an abnormal cardiac mechanism, *per se*, is not an indication for tampering with the heart by employing drugs. It is the circulatory embarrassment, at times attendant upon disordered cardiac mechanism, which requires cardiac remedies.

3. In the electrocardiograms of this case, the auricular impulse continued long after that of the ventricles had ceased. Physiologists have been agreed that the first impulse of the heart is manifest in the auricles during embryotic life. There has, however, been considerable difference of opinion as to whether the last impulse of the heart is due to auricular activity or to ventricular activity. Evidently, some later day physiologists have lost sight of a fact known to Galen and picturesquely commented upon in 1757 by Haller, who says in his *Memoirs on the Motion of the Blood:*

" 'Tis known that, in the dying animal, the auricle contracts itself and palpitates more frequently than the ventricle, and it hath sometimes three, four and even six contractions during one systole of the heart. Perhaps, at the time, the auricle cannot propel blood enough into the heart, so as to execute a motion by way of the stimulus. . . . I have seen also the superior appendix, with much labor, endeavoring to descend, without being able to discharge its blood; at which time the inferior part was at rest."

SUMMARY.

A case of diphtheria is reported clinically and electrocardiographically, in which antitoxin treatment had been neglected for seven days, the patient being sent to the hospital an hour before death.

1. The sustaining effect of diphtheria antitoxin, even on a heart overwhelmed by toxins, is graphically recorded.

2. The heart, within twenty-six minutes, exhibited the following varieties of disordered mechanism: tachycardia; ventricular flutter; ventricular fibrillation; complete atrioventricular heart block.

3. Ventricular fibrillation and heart block occurred after clinical death had been pronounced by four competent observers.

4. As the heart approached the end of life, the ventricular impulse was silent, auricular activity alone being manifest.

5. Two widely separated auricular impulses registered the death of the heart.

323 South Eighteenth Street.

The Neurotic Element in Organic Cardiovascular Disease

By S. NEUHOF, M.D.,
New York.

I do not believe that the rôle of neurotic and psychic disturbances as initiators of symptoms in those with organic cardiovascular disease has been as sufficiently emphasized as in those with purely functional neuroses. The soldier's heart, hyperthyroidism are examples of the latter. It not infrequently happens that patients with heart disease get along fairly comfortably until some untoward psychical disturbance, such as fright, initiates symptoms from which it may take months to recover; indeed they may never regain their old cardiac stability. We are so likely to be engrossed with physical signs during an examination that we may not lend sufficient attention and importance to minutiæ in the history, apparently minor factors which often have an important etiological bearing. I have found that in mitral stenotic lesions especially, mental disturbances can have a markedly deleterious influence. They can not only bring on tachycardia but overforceful cardiac action as well; this may occur with lesions which from the inflammatory and clinical viewpoints had long been quiescent and stable. When studying such hearts prior to the period of abnormal excitation, one observes no differences, either in their fluoroscopic size, the presystolic murmur or other physical or clinical characteristics, which would single them out as being especially susceptible to nervous influences. It is somewhat surprising to note that even from the psychoneurotic viewpoint these patients present nothing abnormal or characteristic. They have no psychopathic stigmata, they impress one as having had stable nervous systems prior to the onset of their neurotic cardiac symptoms, and they do not show any characteristic in general physique which would align them with socalled psychoneurotic or endocrine types. It is important to observe that in those with mitral stenosis and auricular fibrillation, the effect of a neurotic insult is much more marked than in those with rhythmic pulses: cardiac activity becomes more violent, rapid and irregular, there are more abortive beats. Indeed, I believe that such patients may die suddenly as the result of a nerve shock.

I shall first give a few illustrative cases showing the effect of the psychic element in mitral stenosis.

Case I.—R. F., female, aged twenty-two, of slight physique, had had socalled heart trouble since childhood. She had, however, always been able to play normally with other children, with apparently no limitation of her activities. A year ago her mother died unexpectedly. That same day she had palpitation and irregular heart action which had since continued. Physical examination showed a typical mitral stenotic lesion with auricular fibrillation; the latter was confirmed by electrocardiographic tracings. The cardiac rate varied from 100 to 130 a minute. During her stay of several weeks in the hospital, neither rest in bed, digitalis nor bromides had any appreciable influence upon the irregularity.

She was not dyspneic; slow walking did not abnormally increase the heart rate nor the subjective feeling of palpitation. The main complaints were palpitation and some limitation of physical activity.

CASE II.—L. K., female, aged nineteen, had a mild attack of grippe tracheitis during which she had a "choking spell" which frightened her considerably. From the patient's description it was apparently due to spasmodic pharyngeal cough. The spell was immediately followed by rapid heart action, later by dyspnea. Upon hospital admission a typical mitral stenotic lesion was found, there were no signs of decompensation, the heart action was regular, the rate, 90 a minute. There was slight tenderness upon pressure over the precordium. There were no signs of decompensation. Although the patient complained of dyspnea, she could breathe comfortably when lying flat. She was given a few doses of bromides and was assured that her heart was not damaged. After two days the patient felt relieved and was allowed out of bed.

This was an instance in which the tachycardia was temporary but the subjective dyspnea and palpitation continued. Reassurance doubtless played an important part in the cure.

CASE III.—Mrs. C. W., aged thirty-five, had rheumatism five years previously. She had been curetted for an abortion several weeks prior to consulting me. The operation was followed by fever, and articular pains and swellings. When brought to my office she presented all the classical symptoms of severe decompensation—anasarca, dyspnea, hydrothorax. Physical examination showed a typical mitral stenotic lesion, auricular fibrillation and an enlarged heart. The patient was apparently much perturbed and frightened during the preliminary examination, in spite of my frequent assurance that there was no cause for worry and that no part of the examination was painful. The next step was fluoroscopy. She was slowly assisted to the apparatus by the nurse and myself, apparently reassured and calm. No sooner did she sit down in the apparatus than she gave one cry, and died within two minutes. Most probably fright was the underlying cause of the sudden death: one can only theorize as to how this factor operated, possibly by the induction of ventricular fibrillation and death.

I shall now cite two other instances, one of which also ended fatally, in order to demonstrate definite correlation between psychic insults and grave cardiac symptoms.

CASE IV.—I. S., dentist, aged thirty-two, married, had scarlet fever complicated by an attack of articular rheumatism lasting one week in 1900. The only other infections were mild attacks of influenza in 1919 and 1920. In 1915, he was told by a physician that he had valvular heart disease. Despite this knowledge he was always physically active and athletic and never had any distinct cardiac symptoms until the onset of his present complaint several months ago. He then had a good deal of family trouble and disputes which worried him considerably, and which resulted in attacks of tachycardia and dyspnea. Finally there developed hemoptyses usually accompanied by severe left sided precordial pains. Fever was never present. Tubercle bacilli were never found. On examination the systolic blood pressure was 150, the diastolic 50. The mouth, throat and thyroid were normal. There was slight throbbing of the carotids. There was a well defined diastolic murmur heard best over the left base. There was overaction of the cardiac apex, accompanied by a palpable thrill. A soft systolic murmur was also heard at the apex. The fluoroscopic examination revealed definite overaction of the aorta and moderate enlargement of the heart in a downward direction. The knee reflexes were much exaggerated. The urine was normal. There was nothing of moment in the electrocardiogram.

The case was one of rheumatic aortic regurgitation which had long since reached a quiescent stage. Family nagging, however, had directly caused tachycardia. As a result attacks of pulmonary edema and hemoptysis had occurred, or possibly emboli were thrown into the circulation by the violent cardiac action. At any rate, there was no evidence of any rheumatic endocarditic recurrence.

The further course of the case is interesting. The patient was placed on luminal tablets in doses of one and a half grains. He was sent to the country for the summer and was told to do very little walking and to rest out of doors a good part of the day. At the end of several weeks the slight tachycardia and continued consciousness of his heart action present at the first examination disappeared. He was able to walk at a natural pace without any cardiac symptoms. Recently he has again taken up his dental work and feels as comfortable as he ever did. He is gradually taking up his old routine of life.

CASE V.—A. S., male, aged sixty-eight, gave a history of an old gonorrhea, otherwise he had had no infections. He had had sugar in his urine as high as one and a half per cent. for many years; there was no albumin. There had been increasing dyspnea for three years. There were no precordial pains. Examination showed: The systolic blood pressure was 125, the diastolic 70. The carotids throbbed. There was a broad heaving apical impulse. There was no pain on pressure over the heart. The heart was considerably enlarged. On ausculation at the base, there was a slightly accentuated second sound; at the apex, the first sound was reduplicated and accompanied by a systolic murmur. The margin of the liver was at the umbilicus. There was slight edema of the legs. The urine and reflexes were normal. Orthodiascopic examination showed left ventricular hypertrophy and aneurysmal enlargement of the first portion of the aorta. The electrocardiogram showed left ventricular preponderance. The Wassermann blood examination was negative. The diagnosis was cardiosclerosis and left ventricular hypertrophy, with moderate decompensation. The patient improved after having been digitalized.

The patient had a very small rectal fissure which caused much pain and which was sensitive even to the slightest touch. He was finally sent to another physician for further rectal examination with the distinct admonition that undue pain be carefully avoided and that nothing be done or said that would unnecessarily upset, pain or frighten the patient. This warning was heeded, yet the patient was so frightened that he nearly fainted on the examining table. Thereafter, there was immediate increase of the cardiac symptoms: dyspnea became at first distressing, later, constant. The patient died after a few weeks. This was a case of severe cardiac disease. The fatal termination was undoubtedly hastened by the patient's fright at a trivial and carefully executed rectal examination.

I could multiply instances in which the psychic factor initiated symptoms in otherwise stabilized cardiovascular disease, but I believe these few cases are sufficiently illustrative. They likewise illustrate why such symptoms as tachycardia and auricular fibrillation are not controlled by our usual remedies in these patients, and why our prognostic viewpoint regarding them cannot conform to the usual ones in which the neurotic factor is absent. In addition to the customary drug remedies, reassurance and other psychotherapeutic measures play an important part in the treatment.

1000 Park Avenue.

The Significance of Variation in the Quality of the Heart Sounds

By FRANK BETHEL CROSS, M. D., F. A. C. P.,
Brooklyn.

Long ago, in cardiology, the pendulum swung, both in theory and practice, away from considering the valvular concept as the basic condition in heart disease and approximated the truer idea that disability, length of illness and ultimate outlook depend upon the functional efficiency of the heart muscle. Upon this, emphasis has been laid.

It remains, however, to go further and make clear those conditions which reveal the status of the heart muscle. Clinically, dyspnea on exertion, cough, pain, sensations of pressure or palpitation, and cyanosis help to tell the tale, but what, I ask you, is to be found on auscultation that will be of assistance in solving the problem of diagnosis and prognosis that confronts us in the individual case? Among other things, the quality of the heart sounds, and without careful consideration of them the cardiac examination is not complete. All too often do we pass them by without comment. And so, in this paper, I wish to take time to call attention to the importance of assessing the value of heart sounds and recognizing the significance of their variations in intensity, length and tone. Rhythm disturbances are related to a study of heart sounds, normal and pathological, but reference to them will be brief, as upon the subject of cardiac irregularities a volume itself may be written.

The heart sounds are of importance, and our observation of them should be intensive, because certain variations are ominous and others of but trifling moment. The cardiologist must possess, as should every other worker in clinical medicine, the broad view. He must be in possession of all possible facts, be they the disclosures of radiography, the polygraph, the electrocardiograph, or in the physical examination the findings of the more elemental eye, hand and ear, the latter assisted by the use of the humble stethoscope. Today it seems as though overemphasis of the newer methods of study resulted sometimes in a relative neglect of the old. This should not be. New plans of investigation should supplement, not replace the old. Thus our field of vision is constantly widened, rather than that we see through lenses of different glass. From this point of view, I urge that we must not neglect in any case study the consideration of the quality of the heart sounds, no matter what other resources in diagnosis are utilized. On the other hand, the findings should not be overstressed; as in every other branch of medicine, the entire clinical picture must be under critical survey.

A thorough familiarity with and comprehension of normal heart sounds must precede the recognition of variant qualities in these sounds, and so let us identify first the normal auscultatory picture, as represented by the syllables—lubb-dupp.

THE ORIGIN OF THE HEART SOUNDS.

Production, character and time of the first sound. The first sound is produced by the closure of the auriculoventricular valves (the mitral and tricuspid), and by the contraction of the ventricles. When the filling of the ventricles begins, the valve segments (2 mitral, 3 tricuspid) lie against the ventricular walls, but these are floated up to the position of closing by the centripetal reflux as the ventricle fills, and tighten with necessary vibration as the muscular contraction is initiated. The sound, therefore, is the joint result of the valve closure, with its phenomena, and the muscle vibration of the contracting ventricular wall. That a normal first sound may be produced, a normal blood pressure is essential, so that the ventricular muscle effort of normal force may be exerted. Under normal conditions, the valve factor and the muscle factor blend and cannot be individually identified.

The normal first sound is dull and heavy. To it Brockbank applies the adjective "deliberate." There is no flap, as the papillary muscles act as moderators of valve flap through their attachment to the chordæ tendineæ, which take origin from the inelastic valve margins. This action probably is by virtue of the characteristic elasticity which resides in muscle tissue, and to which the papillary muscles are not an exception. Through the preponderance of the left side of the heart in the mechanism of the heart beat, and the greater work of the left ventricle and the greater intraarterial resistance which its work must overcome, the mitral sound is louder and dominates the precordium.

The first sound occupies only the first part of the ventricular systole, so there is opportunity for a late systolic murmur occasionally noted, as well as the more frequently observed murmur which accompanies or replaces this sound. It (the sound) may be heard in varying intensity. Thickness of the chest wall, the interposition of emphysematous lung, pericardial fluid and weakness of the cardiac systole diminish this sound: it may be increased by exertion, fright, or the initial stimulus of bacterial toxin. Later we will consider its pathological modification.

Production, character and time of the second sound. The second sound is normally produced by the closure and vibration of the aortic and pulmonary valves, following ventricular contraction. These are three cusp valves, with no chordæ tendineæ or muscular structures comparable to the papillary muscles, and are largely fibrous inelastic valve curtains. At the middle of their free borders are the corpora arantii. During ventricular systole, the valves lie against the arterial walls, but close with a snap when the contraction terminates and the pressure in the elastic bloodvessels more than equals the intraventricular pressure. There is, quite naturally, no muscle component in the production of this sound, but a factor not to be overlooked is the elastic rebound and vibration of the arterial wall, following its distention by the incompressible blood column thrown into it by the ventricular systole.

The second sound is short, sharp and is spoken of as purely valvular. The term lubb-dupp is satisfactorily descriptive of the two sounds and affords an indicated measure of relative intensity of the two.

The second sound is at the very beginning of ventricular diastole and therefore can be followed or accompanied by diastolic murmurs of defective valve origin.

The third heart sound. In 1893 Barie reported a third heart sound, and in this country Thayer was instrumental in directing our attention to it in 1906. A better term is the diastolic echo, for it immediately follows the second sound, and probably corresponds to the end of the rapid rush of blood into the ventricles and the preliminary apposition of the mitral and tricuspid valve curtains which the blood pool has floated up into place. It is present occasionally in normal persons: is often very faint and distant, and is heard in slowly beating hearts with the patient in the left lateral prone position. Personally I have never heard it. The electrophonograph seems to establish its real existence, and in the polygraph it would seem to correspond to the h wave (the protodiastolic). In mitral stenosis and aortic regurgitation, when the filling conditions in the ventricle are disturbed, it may be recognized. Its presence is not of great significance.

Events transpiring during the heart sounds. From another point of view, it is helpful to have a clear concept of the phases of cardiac action as related to the time of the heart sounds. Thus, when the first sound is occurring, we should recall that the auriculoventricular valves are closed, the ventricles are contracting and a large volume of blood is being delivered into the aorta and pulmonary artery through the open aortic and pulmonic valves respectively. Meanwhile the auricles are sluggishly refilling with blood from the systemic and pulmonary veins. When the second sound occurs, the aortic and pulmonary valves are closed, the auriculoventricular valves are open and the ventricles are beginning to fill as the joint result of gravity and *vis-a-tergo*. The ventricular filling is assisted by the weak systole of the auricle, which occurs in the last fifth of ventricular diastole.

METHOD OF AUSCULTATION.

A word as to the method of auscultation is in order. The binaural stethoscope of bell pattern with flexible rubber tubes is the instrument in common use. Personally I fancy the Bowles's diaphragm stethoscope with one and a half inch aperture. There is no doubt in my mind that I can identify a very trifling murmur of aortic regurgitation with this instrument better than with the bell type instrument, but in the murmur of mitral stenosis, the bell pattern stethoscope must be used if the rumbling murmur is soft and distant. The reason for this has to do with the principles of sound conduction as modified by the pitch of the tone itself. High pitched sounds are better identified by the Bowles's type of instrument. By substituting a thinner celluloid diaphragm for the hard rubber disc, greater sound volume can be gained.

The wooden monaural stethoscope sometimes gives best results, and many times the direct method of applying the ear to the chest affords the most information, due to the large field of tissue vibration. The heart sounds are the more easily timed because of the simultaneous palpation of the apex beat. Unhygienic though it may be, this method should be used whenever stethoscopic auscultation does not give definite findings. C. L. Greene suggests that the suprasternal fossa be always auscultated for basal heart sounds. As we always palpate this area, this advice can be easily followed. Occasionally auscultation at the acromion process reveals definite information, especially with regard to aortal and basal conditions.

The sounds are always best timed by the apex beat or carotid pulse.

VARIATION IN THE QUALITY OF THE SOUNDS.

1. *Variations in the quality of the first sound* results from changes in the valve cusps, the cardiac muscle, or the blood pressure, these factors operating singly or together. Local conditions in the pericardium also influence the intensity and character of the sounds. The first sound may be weakened, absent, increased, accentuated, or reduplicated.

A weak first sound is usually due to an enfeebled cardiac musculature and is seen in longstanding infections—typhoid, tuberculosis, diphtheria, scarlet fever, rheumatic fever, and exhausted physical states, or in chronic or primary myocardial degeneration. In addition, it may be due to fibrous thickening of the mitral and tricuspid valve segments, which causes them to close stiffly and slowly. Or thinning of the ventricular wall, with dilatation, produces a poor first sound, the muscle factor being decreased relatively as the valvular component is accentuated, and probably because the papillary muscle tissue has lost its elastic property temporarily and the papillary muscles are acting as mere guy ropes. Low blood pressure and pericardial effusion, emphysema, excessively fat chest wall, all affect the sounds.

Impure and murmurish are terms applied to a poor muffled first sound. Sahli explains the poor quality of the first sound in mitral regurgitation on the basis of lessened initial tension of the ventricular muscle, as it contracts down on a blood volume which is escaping in part through the incompetent valve as well as being projected into the aorta.

The first sound is absent when the ventricular systole is of very poor force or a loud systolic murmur masks the normal sound. Sometimes the first sound has a peculiar tympanitic quality, when the stomach is much distended with gas.

An increased first sound—dull, prolonged, thudding, booming—accompanies ventricular hypertrophy uniformly, is due to the accepted muscle-volume-sound-production phenomenon, and must be differentiated from accentuation. In the influenza pandemic a curious flapping first sound, short, hollow, and markedly increased in force, was heard in certain cases with pneumonia and low blood pressure. It was heard by me when standing by the bedside: in one instance three feet intervened between the patient's precordium and my ear. It is possible that the frequent overdosage with digitalis was a factor in its production, but it seems more likely that an acutely toxic heart in delirium was the true cause.

Accentuation of the first sound needs careful consideration. The circumstances under which a heart examination is made, the significance attached to it by all patients and the apprehension lest serious disease may be diagnosed all operate to make even a rather stolid patient nervous, and the accentuation of the first sound must therefore always be carefully appraised, and the nervous systole discounted. The augmentation of the systolic thrust following exercise is, of course, readily recognizable and quiets down quickly with a few minutes rest, if the response to exertion is normal. When the ventricles are dilated, the valves are more suddenly closed as the papillary muscles have lost in part their elastic pull, and the systolic note becomes shorter, sharper and clearer, the valvular quality becoming relatively predominant through the recession of the emphasis of the muscular factor. Add to this, thickening of the valve cusps, as occurs in mitral stenosis, and there is adequate explanation of the well known sharp, short, flapping or snapping first sound of mitral disease. It is Broadbent who suggests that the reduced or partial filling of the ventricle in mitral stenosis permits a slapping action of the heart muscle in contraction and thus produces the knocking first sound.

Reduplication or splitting of the first sound results from the fractional difference of time in the contraction of the two ventricles. Generally these are in true synchronism, in so far as the ear can detect, although by delicate instrumental study it has been determined that the left heart commences its systole a fiftieth of a second earlier. The reduplication recognizable by the physician postulates a much longer interval than this, and has been accounted for on several bases. The cause commonly advanced is that there is a lack of synchronism in the contraction of the two ventricles, due to blood pressure imbalance in the systematic and pulmonary circulation, and that the ventricle laboring, generally the left, has an advanced contraction time. There exists always a greater blood pressure on the left side, to which the greater thickness of the left ventricular wall bears adequate testimony, and with further changes in the blood pressure, ventricular hypertrophy on either side of the heart would follow, in accord with the side affected. Thus Nature attempts to meet the new demand on the heart strength. The next step is one of breaking down of the cardiac machine, and is either muscle failure or dilatation with relative valvular insufficiency. It is in cases of myocardial failure, with or without increased blood pressure, that reduplication of the first sound appears. In such failure, the loss of potent pull of the papillary muscles must not be forgotten, as a prominent feature, and it may be the secondary relaxation of these muscle bodies and their resultant action as mere stay ropes, instead of elastic muscle tissues gradually meeting the strain of the ventricular systole, which permits the valves to fly back into a state of secondary tension and produce the reduplication, which thus is part muscle vibration and part identifiable valve closure sound. We think of reduplication as represented by the word "ter-up." With this conception of reduplication in mind, its significance is apparent: namely, an indication of severe involvement of the cardiac muscle. The exception to the rule is that it may be heard in the normal heart functionally disturbed, and occurs then in the deflated chest on deep breathing. Recently a lesion in the right branch of the auriculoventricular bundle has been identified in some cases of reduplication of the first sound. Thus more certainly do we feel that such reduplication has definite significance.

2. *Variations in the second sound.* The second sound may be weak, absent, accentuated or reduplicated.

The second sound is noted weak when the cardiac muscle has lost power and the blood pressure is low. In the long typhoid fever cases, previously seen, it was customary to note a weak or absent second sound, and not to allow the patient up until the cardiac tone was restored. Today, with the more generous feeding schedule, I have noticed how rarely this is observed. Very fair heart sounds usually obtain throughout the fever.

In mitral stenosis the second sound is weak largely through the lessened volume of blood thrown into the aorta. Another factor is that when ventricular hypertrophy occurs, as in mitral stenosis, the apex of the left ventricle is pushed away from the chest wall by accompanying conditions on the right side of the heart: the aortic second, which sound is heard at the true apex of the heart, thus becomes fainter, as the apex recedes from its contact with the chest wall. Hence, the greater the apex recession, the fainter the second apex sound; and the corollary—the fainter the second sound at the apex in mitral stenosis, the more serious the mitral lesion.

It may be absent if the valve cusps are thickened by fibrotic change and cannot functionate normally. A murmur, due to aortic regurgitation, may replace the aortic closure sound, or it may accompany such sound, modifying its intensity. If murmur does not entirely replace second aortic sound, we consider lesion less developed and prognosis better.

In aortic stenosis, we would regularly expect the second sound to be absent, as but little blood is thrown into the aorta and the valve curtains fill slowly and inadequately. One should always suspect, if only to rule it out, aortic stenosis if the aortic second is weak or absent.

The accentuation of the second heart sound has many and varied significances. We have rehearsed the causes of the production of this sound, but there are certain physiological variations in its character which require particular consideration. Apart from the accentuation, which comes at the end of deep breathing, when the breath is held, there are differences in the relative intensity of the aortic second and the pulmonic second at different ages in life. Cabot was one of the first in this country to emphasize this point. In childhood and adolescence the pulmonic second sound is normally louder than the aortic second, from twenty-five to forty-five the pulmonic second and aortic second sounds are about the same: after the fiftieth year this is again changed and the aortic second is normally louder.

The aortic second sound is markedly accentuated with high blood pressure of simple hypertension or that of chronic nephritis. When the aorta is dilated (and I am thinking both of the dilated sthenic aorta of the day laborer and the luetic dilatation accompanying aortitis and aneurism) the second sound may be ringing, at times clanging in character. The valves are fairly crashed together by the unusual volume of blood in the expanded aorta, and valves and arterial wall vibrate excessively to produce this sound. The thickening of the valve cusp borders and the calcareous roughenings and irregularities often contribute their share to the noisy functioning of these valves. At times we may note the socalled bottle popping character of the second sound which accompanies excessively high blood pressure cases with aortal dilatation (1).

The accentuation of the second pulmonic sound has likewise special clinical interest. In mitral disease, a diagnosis is withheld unless accentuation of the pulmonic closure sound is identified, and yet here, depending upon the extent of the lesion, the variations of the pulmonic second are several. In early mitral disease, and I must say parenthetically, that by this is meant involvement of the mitral orifice to the extent that incompetency of the valves exists without recognizable stenosis, the pulmonic second sound is uniformly accented. It is sharper, shorter and cleaner cut. As stenotic changes occur, the volume of blood entering the left ventricle is decreased, and there is a sharp contractive effort resulting, which gives the knocking first sound already referred to, slaps the examining hand held to the precordium, and through back pressure closes the pulmonic valves with a sharp snap. When the stenosis, increasing, leads to later stages of mitral disease, the second sound over the pulmonic area continues accented, but the second sound at the apex, as transmitted downwards, is gone. As stated before, upon the weakness or entire disappearance of the apex second sound rests, in part, the unfavorable prognosis in mitral stenosis. Occasionally the accentuation of the pulmonic closure sound in a case of mitral regurgitation is diminished. In this instance, the leak is very small or a forcibly acting left ventricle drives the blood onward and the pulmonary circulation is relieved of its usual congestion. The back pressure theory is well sustained from a physiological standpoint and plays a practical part in any consideration of mitral disease.

In lobar pneumonia the accentuation of the second pulmonic sound is an outstanding feature of the cardiac bypicture. Relative obstruction in the pulmonary circulation at the site of the lung lesion is probably responsible for this. If the accentuation persists, we feel quite content with the prognosis, other phases of the pneumonia being satisfactory; but if the accentuation begins to fade, we sense the situation that the right ventricle is not emptying completely, but losing power and beginning to dilate. Both auricle and ventricle participate in this dilatation; the pulmonic second sound accentuation decreases, tricuspid regurgitation becomes iminent, and the prognosis correspondingly grave.

Reduplication or splitting of the second sound is due to asynchronous closure of the aortic and pulmonary valves, and in mitral stenosis may be accounted for by the quickness with which the poorly filled left ventricle throws its content of blood into the aorta, the aortic valves therefore closing a trifle sooner than the pulmonary. In this case, a double sound would be produced. In hypertensive conditions of either the systemic or pulmonary circulation, reduplication of the second sound is sometimes noted. It is customary, therefore, to suspect mitral stenosis with a reduplicated second sound, especially when heard at the apex, and the presence of a presystolic rumble generally confirms the suspicion. No second sound reduplication is to be slightingly passed over. Every case should be subjected to careful study, for it is evident that some definite factor has modified this closure sound, even though it be merely the atonic state of a beginning ventricular dilatation. T. Howard (2) reported findings of this character in seven out of fifty cases of early secondary syphilis.

NORMAL LUBB-DUPP (3-5) RHYTHM AND ITS DISTURBANCES.

The cardiac irregularities constitute an important field of heart study. It is not my intention to discuss them as a group, but there are two disturbances of rhythm to which I shall call attention: tic-tac rhythm and gallop.

In tic-tac rhythm the spacings are equal and the sounds much alike in quality. This is the fetal, or embryocardial, or pendulum type. In diseased states it is observed in weak and exhausted conditions, and it spells myocardial failure in varying degree.

In gallop or cantering rhythm, three sounds are heard, there being marked reduplication of either the first or second sound. Particularly here, because of the difficulties in timing the sounds accurately, dependence should be placed on the carotid pulse, which is only .05″ (one twentieth sec.) later than the ventricular beat. Any one of the three sounds may be accented. The split or reduplicated first and second sounds are the more easily recognized: to wit, ter′-up=tup, ter′-up=tup, and lub=ter′-up, lub=ter′-up. The significance of reduplication has already been discussed.

When the accent falls on the second phase of the reduplicated sound, the accent suggests the gallop of a horse. Thus, the examiner hears: ter-up'=tup, ter-up'=tup, the extra sound being in presystole and the arrhythmia therefore being spoken of as the presystolic gallop, in which a similarity to the repeated word "symbolic-symbolic" has been noted by many writers. On the other hand, it may be the second phase of a doubled second sound which is accented, the sounds being represented by lub=ter-up, lub=ter-up. As diastole is infringed upon, this form is spoken of as the protodiastolic gallop. It has been further indicated in teaching by the accent of the repeated word, "intervene, intervene." When the pulse rate is very rapid, it is difficult to time and identify this type of gallop.

Both forms of gallop rhythm have varying significance. The presystolic gallop occurs chiefly in high blood pressure cases with dilatation of the already hypertrophied ventricle, and is observed occasionally in the course of severe acute infectious disease. Under these conditions it is of serious portent. The protodiastolic gallop ordinarily is identified in slow hearts, but it may appear in cardiac asthenia of severe degree.

When the diastolic or rest interval is shortened and the sound heard is in middiastole, the reduplication has much greater significance and the prognosis is greatly obscured, as cardiac exhaustion is most apt to succeed upon lessening of the duration of the periods of ventricular rest. In hypertensive and known myocardial cases, the outlook is correspondingly grave as the rest interval is shortened.

TERMS DESCRIBING HEART SOUNDS.

It is to be regretted that there is not a definite terminology in regard to heart sounds, but, as in all branches of medicine, adjectives are frequently so individual in their use that, unless we are constantly associated with a clinician, we do not understand exactly the particular use of his favorite descriptive words. Thus arises the application of many adjectives to the same condition. Standardization of nomenclature is desirable, but will admittedly be hard to effect. The matter may properly some day be a subject for review by a national group of cardiologists.

REFERENCES.

1. Butler, G. R.: Personal communication.
2. Howard, T.: *American Journal of Medical Sciences*, July, 1917.

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The Prevention of Arterial Disease

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Although it is possible to classify arterial disease after a fashion postmortem, no classification has as yet been devised which admits of clinical application except that on the basis of etiology. If accurate classification was generally possible it would be of tremendous value, but it, too, is unsatisfactory in so far as the individual case is concerned, because in every instance many diverse factors enter. It is practicable in many instances to define the probable dominant cause, however, and while this is of great assistance in the management of cases precise differentiation into atherosclerosis, arteritis, arteriocapillary fibrosis and the like, is rarely possible. For the purpose of the practitioner it must suffice, then, to group anatomically arterial disease as it occurs clinically as one general process, differing only as to its phases and its etiology.

The futility of treatment in arterial disease is evident to every physician when the process has become fully developed. It is possible, however, in syphilis and to a much lesser degree in some instances of gout actually to remove the lesion to some extent at least, otherwise little in a remedial way can be accomplished in advanced arterial degeneration. This fact, however, in no way minimizes the value of treatment for the relief of symptoms and in a palliative way. To some degree treatment may even in late stages of the disease check or retard progress and is therefore of very great practical value, but our main hope lies in the prevention of the condition. This may be accomplished by the early recognition of the process while its changes are still so immature as to render removal of the lesion or the check of its progress of really curative value. I shall later refer briefly to certain methods which thus sometimes make it possible to recognize the early manifestation of arterial disease at such a period.

As stated above, it is not possible as yet clinically to recognize and classify arterial disease, since in the average case several or many different anatomical forms of lesions are present. They appear practically then rather as stages or phases of a universal degenerative or inflammatory tendency, inexplicably involved with changes of an undoubted physiological, curative or reparative effort on the part of Nature. As age increases these reparative tendencies rapidly decrease and the lesions become blended with the degenerative processes of age.

Clinically one sees in arterial disease even in the early manifestations a very definite selective tendency to attack most extensively at least those systems or viscera most subjected to stress. Many years ago I pointed out this tendency in an article presented before the New York Academy of Medicine. Thus, in persons most subjected to muscle and physical stress, such as farmers, athletes, iron workers, and the like, most extensive and earliest arterial disease appears in the arterial systems of the extremities. The lesions are then found most fully developed in the vascular paths of the skeletal muscles and the larger trunks are chiefly involved, the aorta, the femorals, brachials and their immediate subdivisions. This is shown notably in the tendency toward intermittent claudication in persons physically overactive, as in pedestrians, runners, oarsmen, and the like.

In the gourmet, the trunks of the metabolic organs as the liver and gastrointestinal tract are mostly diseased, in the mental worker or in those whose responsibilities demand stress of a nervous and mental nature, the trunks of the cerebrospinal axis suffer most. In those whose life or habits cause unbalanced strain on the excretory organs, as in the gouty, in alcoholics or in plumbism, the vessels of the excretory organs, notably of the kidney, appear to be most extensively or earliest involved.

If we accept this as a more or less general law or tendency, attempts at prevention must be directed to a better balance of life requirements. The man whose position demands great nervous and mental strain must counterbalance these tendencies by a reasonably active physical life. The person who insists on abundant or too rich food intake must burn it by physical activity and by greater mental effort. Such measures doubtless to a more or less degree minimize or check progress of arterial disease, especially of the degenerative type.

There can be no doubt that a diet too rich or unbalanced will lead to arterial disease and the prevention of this form of arteriosclerosis demands a proper dietetic balance. This cannot be determined on any absolute caloric basis. The particular demands of the body and its functions and to a considerable extent its climatic environment must determine the diet in any individual case. The diet of the Esquimo hunter is no more fitted to the needs of the college professor than his to the hunter. In either instance the adoption of the dietetic customs of the other would result in metabolic toxin production or in undernourishment, either of which condition may induce or produce arterial disease.

Too much food, or improperly chosen foods which cause the deposition of abnormal and unnecessary adipose tissue, or which through their products of disintegration overburden the digestive organs, cause arterial disease. The proper determination of the foods suitable in any given individual cannot then be based on generalities but are entirely individualistic and in their determination the digestive peculiarities of each person, his requirements, environments and to a certain extent his ancestral type must decide. As a rule, excessive rather than insufficient food is the American fault, and there is no doubt that this is a productive factor in the very high frequency of cardiovascular disease now evident among our people. This fault is particularly manifest among our mental workers, who, as a general rule, elect proportionately a richer and higher caloric diet than most farmers, for example.

As to exercise in the production of arterial disease, it needs no argument to convince practical physicians that excessive physical work is a highly productive factor of arterial disease. As a nation we are given to excesses in this respect in our early youth and more frequently to an insufficient amount in adult life. A combination of these two factors is particularly seen in many college men who afterward successfully engaged during adult life in sedentary occupations. There is now manifest, however, in our colleges a tendency to more temperance in athletics and an attempt to develop the whole student body in general athletic ability rather than to train excessively, and usually to his ultimate detriment, the specialist, whose after life, unless active exercise is maintained, is shortened and injured by the unreasonable activities of youth, especially when followed by the practical absence of physical work during his active business career. It is pleasing to note that the college athlete is now more temperately trained, and perhaps of even greater importance is the fact that the middleaged man has found his arterial salvation in golf or other outdoor sports suitable to his age and business requirements, or in the observed training furnished now so satisfactorily in many gymnasiums.

Adequate rest is an important factor in the prevention of arterial disease. Perhaps no one other factor is found so frequently as a cause of arterial disease as inadequate rest, mental or physical. Lack of proper rest is in itself one of the most potent factors in the production of premature old age, which is in considerable part anatomically generalized arterial disease. The average adult doing an average amount of normal work, mental or physical or a happy proportion of the two, requires about eight hours of sleep out of the twenty-four. Some individuals require more, a few can maintain their normal efficiency on much less, but not so the average man. Not only is sleep necessary, but relaxation also. Sleep, relaxation and diversion lower blood pressure perhaps more effectually than any other physiological factors. Heart rate is diminished in the same manner. There is no more potent factor in the limitation of arterial disease than rest, as applied in sleep, relaxation and diversion. A timely vacation with the relaxation which goes with it will be found greatly to modify arterial tension and disease. This is one of the most certain and definite measures which we have for the prevention of arterial disease.

For the mental worker, mild exercise, such as is well calculated to the needs of the individual, especially in the man of overintense and worrisome temperament, is to be rated as rest, for mental rest and relaxation may be agreeably and beneficially accomplished by properly selected exercise. When exercise is associated with pleasure, as it always is, the gain is far greater. Clinical experience has shown beyond question that these measures check or delay definitely the progress of any arterial disease which has been induced by contrary or other independent conditions. Where occupational demands do not permit of adequate rest, relaxation and diversion, conditions may often be changed and if this be done in time the progress of the disease may be halted. It may be necessary even for the patient to select some entirely new vocation, which is freer from the abnormal demands which were productive of the changes in question.

Many infections, perhaps even most infections, cause arterial disease. The frequency with which active arteriosclerosis develops after attacks of influenza, pneumonia, rheumatic fever, typhoid and the like, is a sufficient illustration of this point. In many of these cases it appears that a too early return after convalescence to the usual demands and rigors of life may be the chief factor in this respect, but in other cases so definite is the arterial disease in its relation to some infection that one is impelled to lay it to the direct action of the toxins of the infection. It is important, particularly for the individual, ancestrally or as a result of his conditions of life inclined to manifest arteriosclerosis, to take a sufficient and carefully observed period of convalescence after any of the infections. Particularly is this true of rheumatic fever, pneumonia, typhoid fever and chorea.

This relation is also definitely seen in cases of low grade but persistent infections, such as tonsillar, dental, sinus, antral, prostatic and uterine infections, in osteomyelitis and even in bronchiectasis, chronic bronchitis, and so on through the numerous forms of focal absorption. In cases which show progressive and otherwise unexplained arterial disease, a thorough search of the body should be made in order that any hidden infectious foci may be eliminated. It is my belief that tonsillar infections particularly are blamable in many instances. The same may be true of dental infections also, though this appears less definitely proved than is that of the tonsils.

Syphilis is so constant a cause of arterial disease of the most serious sort that its existence should be intimately inquired into in every case of unexplained arterial degeneration or inflammation. I am so strong in the belief that every case of incompletely cured syphilis, no matter how quiescent it may be, is potentially an instance of serious arterial disease, that I feel every case of this infection should be automatically assumed to be an instance of active arterial disease and that it should be submitted to protracted treatment. It is truly remarkable the degree to which arterial disease resulting from syphilis can be removed by active treatment, even in instances in which, save for the arterial disease, no evidences of activity may be evident.

The relation of gout to arterial disease, often of most active character, seems to be definite. One practically never sees a case of gout in its active phases in which arterial changes cannot be readily made out. Where symptoms appear as a result of these arterial changes, as for example in those in which angina pectoris develops, in many instances the symptoms, as well as the demonstrable lesions in the arterioles, promptly subside under proper antigout medication and diet. The author has seen a recent case in which very severe attacks of angina pectoris developed in the course of an acute exacerbation of an old gout and in which merely antigout treatment gave prompt and apparently final relief from the angina.

The concurrence and close relationship between nephritic and arterial disease need not be elaborately discussed, so generally is this relationship recognized. That the progress of the arterial disease will be checked by a correct management of the renal problem, is very certain. The same relationship is also seen in most forms of liver disease, including infections of the gallbladder and gallstone. All this seems to have been established from a clinical viewpoint and the bearing of these conditions on the development of arterial changes is an argument well worth considering in relation to operative cure in all those instances in which these conditions are known to exist.

Thus far I have merely mentioned in passing arterial hypertension as a factor in the production of arterial disease and certain methods of combatting this element in the prevention of arterial degenerations. No doubt we have as a class recently overestimated the factor of hypertension in its relation to disease, just as a few years ago we took too little account of it, doubtless for the simple reason that we had at that time no adequate means of determining it clinically.

To a considerable degree, however, we have already mentioned several conditions productive of arteriosclerosis usually associated with hypertonia, such as nephritis and gout. Hypertension is also a factor which not infrequently must be attacked directly, and it is then important for us to select those instances in which it appears as a disease process in itself, in distinction from those, probably more numerous, in which hypertension is an evidence of physiological attempt. This is, as a rule, the case in nephritis, in which as a result of the renal disease an increased pressure is imperative in order that the circulation through the kidney may be maintained. It is obvious that if a successful attempt is made to decrease pressure in such instances urinary secretion may fail and death follow. Those cases of hypertension which follow, however, as a result of worry, of stress, or of a badly balanced life and thus furnish a very potent factor in the production of arterial disease, may be relieved, cured if you like the term better, by the reduction of the blood pressure, preferably, of course, by the relief of the factors concerned in the production of the hypertension.

There are also instances of hypertension caused by constipation, whether as a result of the absorption of toxins consequent upon this habit, or from other and perhaps more obscure factors. Such patients may obviously be greatly relieved by treatment designed to relieve the constipation, and in this relation I should strongly advise the use of abdominal massage, of the establishment of habit in ordering bowel movements, or the stimulation of normal discharge by the choice of a diet containing more waste materials, "roughage," as the stockman calls it, or by the use of more water.

There are other instances in which no adequate explanation of the hypertension can be made out, some of which probably being evidences of a familial tendency. One finds by no means infrequently families in which most members manifest hypertension without any apparent cause except this family trait. I have never seen a family in which this tendency is early evident in which I was not able to demonstrate also the early development of arterial changes. It is my opinion that in most such cases, the hypertension is but a symptom evidence consequent upon the arterial change, itself of familial character. In certain instances, however, which are classed under the diagnosis of hyperpiesis, very definite relief may be accomplished by the vasodilators, the nitrites, the bromides, possibly to a certain extent by the iodides. There is no question in my mind that in this small group of hypertensive cases the progress of arterial disease may be limited by the treatment of the hypertension as a productive factor of arterial degeneration. The limitations of space do not permit me to discuss this factor further.

I have left until the last the consideration of that factor which in my experience I have found to be the most frequent cause of arterial disease as I meet it in my work. This is heredity. There can be no reasonable question that arteriosclerosis is as definitely a hereditary trait as facial conformity, or hair and eye coloration. It is true that we can do little to prevent this tendency, for in but few instances is it possible to follow the naïve advice of Oliver Wendell Holmes in the selection of our ancestors, nor is the physician often thanked for advice in matrimonial selection. But where known traits of heredity are recognized much can be done in the particular care to which the offspring of these families may be instructed as to their habits of life, care as to exercise, the use of alcohol, highly nitrogenous diet, or as to the selection of an occupation, avoiding such as demand on the one part severe exposure, overexertion and great physical stress, and on the other hand, a too sedentary occupation with great nervous or mental strain. In families of this heredity special care must be taken in the early detection and elimination of all infectious foci, in the correction of early gout, and in short in the direction of every necessary phase of life. No doubt marriage between individuals of families in which arterial diseases is notably prevalent should be discouraged. Early arterial alterations should be carefully searched for at systematic intervals in families of this tendency. I have previously called attention to the value of the early study of the conjunctival vessels in which apparently very early evidences of arterial diseases may be detected and when any such changes become manifest the patient's life habits, his diet, rest and recreation periods, his occupation and all other phases must be intimately considered in order that all possible extraneous factors may be excluded.

I have, I am sorry to say, little faith in the use of medicines in the checking of arterial disease except when some specific condition of causative relation may be thus attacked, as in lues, gout, certain cases of chorea or rheumatic fever. Secondary and symptomatic conditions which arise may, however, be beneficially treated, as, for example, the anemia of convalescence, hypertension in some instances, and similar conditions.

There is no condition before the profession today of more importance than that of cardiovascular disease in which the arterial factor plays a most important part, and it behooves us all to study our cases thoroughly and at as early a phase as possible. This advice in my opinion is particularly important in the frequent instances of familial or hereditary arterial disease and in the young of these families. An intimate study of their condition should be made at frequent intervals, so that the very early changes indicating a conformity to the familial disease should be detected. Good results in all cases depend on early recognition, careful and discriminative study, and individualistic management.

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The Importance of Posture in the Physical Examination of the Heart

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No cardiac patient has been properly examined who has not been examined, when possible, both in the erect and recumbent positions; and no description of cardiac physical signs can be considered scientific in which the posture of the patient at the time of observation has not been stated. I am sure that no one of experience, who habitually examines his heart patients in both positions, who is not deaf, who can percuss clearly, and who uses a straight wooden stethoscope, will find fault with these two statements.

In the following paper I propose only to deal with the erect and recumbent postures; they are the ordinary postures in which we examine our patients, and my own work has been limited to them. So far as I am aware, the only points of practical importance at present determined, as regards cardiac physical signs, in changes to other positions, are the fixity of the apex beat and the cardiac dulness in cases of adherent pericardium, on turning to either side.

GENERAL SUMMARY.

The change from the erect posture to the recumbent produces the following results:

1. Raises and narrows the normal cardiac dulness.
2. Makes the first sound duller and the second sound sharper, so producing the classical "lub-dup."
3. Lessens the anteroposterior diameter of the chest.
4. Almost always markedly narrows the dulness of an enlarged heart, particularly rightwards.
5. Increases the loudness and area of audibility of: a. Hemic murmurs, both at apex and base, apparently always. b. Mitral and tricuspid regurgitant murmurs, almost always. c. Aortic forward murmurs, usually. (Some of these murmurs, a, b and c, may only be audible in the recumbent posture.)
6. Lessens the loudness and area of audibility of: a. The venous hum in the neck in anemia, apparently always. b. The presystolic murmur of mitral stenosis, usually. c. The socalled cardiopulmonary or

respiratory murmur, usually. (Some of these murmurs, a, b, c, may only be audible in the erect posture.)

7. Leaves almost unaffected the murmur of aortic regurgitation.

8. Increases the loudness of the accentuated pulmonary second sound.

9. Makes more marked the reduplication of the reduplicated pulmonary second sound, apparently always. (In some cases the reduplication is only heard in the recumbent posture.)

10. Causes the partial or complete disappearance of the cardiac dulness in certain cases of cancer (the cardiac sign in cancer).

11. Causes the apex beat to rise an interspace in some cases of much enlarged heart, or (much rarer) of normal sized heart with abnormally lax supports (cases of cardioptosis).

12. Narrows the dulness of pericardial effusion. and resonance in hydropneumopericardium.

13. Changes the distribution of precordial dulness

14. Sometimes makes audible a friction sound in pericarditis, not heard in the erect position.

15. Increases the distance at which a distantly heard first sound is audible, as in Graves's disease. By a distantly heard sound I mean a sound audible without a stethoscope at a distance greater than the length of the ordinary wooden stethoscope, i. e., nine inches.

I shall endeavor to deal with these facts from a practical point of view, only explaining where explanation seems to reinforce experience.

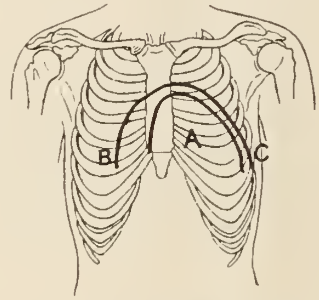

FIG. 1.—Normal heart dulness; shaded area A, dulness in recumbency; B and C, outline of dulness in erect position. The latter is somewhat wider than usual.

THE WIDTH OF THE HEART.

Defined by percussion in the erect position.—The width of the heart, our best guide to its size, a matter of the utmost moment to determine, can (apart from radioscopy) only be ascertained by percussion and, in most cases, only in the erect position. The exceptional cases, in which the dulness is the same in recumbency, consist of 1, hearts so large and firm that they are too tightly wedged between spine and sternum to drop away in any degree from the anterior chest wall on recumbency; 2, hearts tied to the anterior chest wall by adhesions; 3, hearts pinned against the anterior chest wall by some abnormal structure behind, such as an esophageal growth.

Difference of dulness in the two positions.—So great, in most cases of cardiac enlargement, is the difference between the width of the cardiac dulness in the two positions that the most serious misapprehensions as to the progress of a case are practically inevitable to anyone who, ignorant of the difference, examines his patient sometimes in one posture, sometimes in the other. Fig. 1 shows the two dulnesses in a normal heart, Fig. 2 in an enlarged heart. The three following cases suffice to show what grave confusion may arise from indiscriminating examination of the width of an enlarged heart in different positions on different occasions. Extreme cases are chosen.

TOTAL WIDTH OF DULNESS.

	Erect	*Recumbent*
Case A.	9 in.	5 in.
Case B.	8¼ in.	4½ in.
Case C.	8 in.	5 in.

The rightward edge of dulness most changed.—It is the rightward edge of dulness which is most affected by the change of posture. The left edge usually alters less than half an inch. The right moves much more widely. This was shown in Figs. 1 and 2. The following examples from less extreme instances of enlargement than A, B and C show how marked may be the change, even in ordinary cases.

WIDTH OF DULNESS TO RIGHT OF MIDLINE.

	Erect	*Recumbent*
Case D.	2 in.	0 in.
Case E.	2 in.	⅛ in.
Case F.	3¼ in.	1¾ in.

Closeness of erect percussional estimate.—In the recumbent posture, as is evident from the foregoing, the dulness usually gives no reasonable idea of the real dimensions of the heart. In the erect position, however, an excellent idea of the actual width may generally be obtained by percussion — practically as good as by radioscopy, if we only remember that, in the absence of emphysema, while the leftward edge of percussion almost exactly indicates the left border of the heart, the rightward edge falls short of the real right border of the heart by only about half an inch.

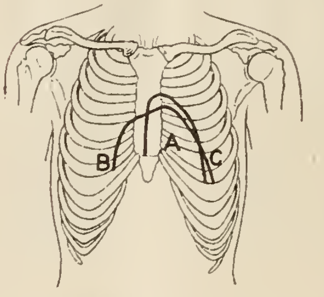

FIG. 2.—From a case of hypertrophy and dilatation of the heart. A, shaded area, dulness in recumbency. B and C, the outline of dulness in the erect position. B and C is not always higher than A.

This extremely important fact is easily verified by marking with a blue pencil on the skin the left and right edges of the dulness, fastening short lengths of wire over the pencil lines with adhesive strapping, and then skiagraphing. Figs. 3, 4 and 5 are diagrams from photographs so taken. Fig. 3 is from a child with mitral stenosis, Fig. 4 from an adult with aortic regurgitation. Neither of these had emphysema. Fig. 5 is taken from a patient with greatly enlarged heart and emphysema in whom the wire was attached all round the area of dulness; considering the difficulty caused by the emphysema, the approximation to the size of the heart is surprisingly close.

In estimating the value of percussion, it should be remembered that, in successive examinations of the same patient, even the moderate error of the method remains constant, and therefore does not prevent a sound judgment of the increase or decrease of width, provided the erect posture is maintained at each examination.

EXPLANATION.

The parietal pericardium is attached to the chest wall at the anterior mediastinum, which usually lies

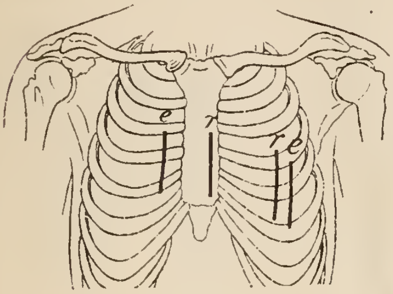

Fig. 3.—From skiagram of heart showing wires fastened along lateral limits of dulness; e, in erect posture; r, in recumbent.

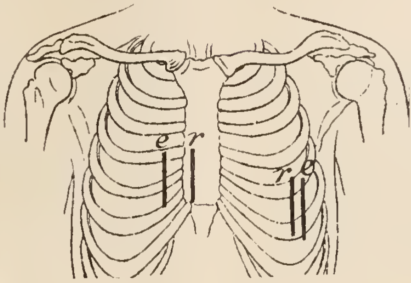

Fig. 4.—From skiagram of heart showing wires fastened along lateral limits of dulness; e, in erect posture; r, in recumbent.

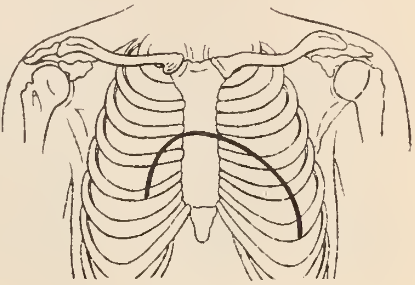

Fig. 5.—From skiagram of heart showing wire fastened along outline limit of dulness in erect position.

almost entirely to the left of the middle line; and "is small, bounded in front by the left border of the sternum and the ends of the fourth, fifth and sixth left costal cártilages; on each side by the pleuræ" (5). On either side of it the heart is free, on recumbency, to withdraw its pressure from the anterior chest wall and, where the fold of the pleura allows the lung to slip forward to replace the heart (as is especially the case on the right side) actually to drop back from contact with the front chest wall. Fig. 6 is slightly modified from Plate XII of Braune's *Atlas of Topographical Anatomy;* I have altered the width of the anterior mediastinum enough to bring it more into accordance with MacAlister's description; but, to avoid unfairness, I have made it reach less far leftwards than it is shown to do in MacAlister's section on p. 335, or in Braune's section, Table XIII. This location of the anterior mediastinum is important, as it helps to explain why the cardiac dulness to the left of the midline remains so nearly unaltered by posture.

It will also be seen from this figure that, whereas the part of the heart which normally lies to the left of the midline is made up of the thick walled ventricles not apt to change their shape, the part to the right of the midline is chiefly composed of the thinner walled and presumably less rigid right auricle which, when dilated and full of blood, would be likely to drop back somewhat from the anterior chest wall on recumbency.

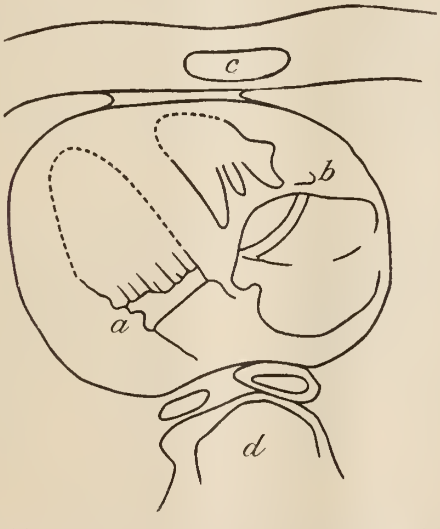

Fig. 6.—Diagram of transverse section of the body passing through heart (Modified from Braune). a, Mitral valve; b, tricuspid valve; c, sternum; d, vertebra.

THE LEVEL OF THE HEART.

When the recumbent dulness is compared with the erect it will commonly be found that the upper limit of the latter is rather lower, and this perhaps indicates a slight drop of the heart. Usually that is a small matter; but in some cases, in which apparently the heart supports are abnormally lax, a considerable drop of the heart may occur (socalled cardioptosis) and may lead, as in the following instance, to an error in diagnosis.

Case.—M. E., aged twenty-one, male. A diagnosis of enlarged heart had been made, because his apex beat was in the sixth space in the erect position. He had been suffering from attacks of faintness. On assuming recumbency, however, his apex beat rose to the fifth space, and in both postures the width of the heart was found normal. No valvular lesion existed. He had also marked right nephroptosis and some apparent gastroptosis. The case was one of neurasthenia with cardioptosis.

THE DEPTH OF THE CHEST.

The change in the width of the dulness with change of posture might perhaps be even greater than it is, were it not that on assuming recumbency the sternum itself tends to fall backward toward the spine. The consequent decrease in the anteroposterior diameter at the nipple level, when it occurs, varies considerably; in a rigid chest no change at all may occur; in an elastic chest the change may exceed an inch. In thirty-six unselected cases the decrease averaged nearly five eighths of an inch. The measurements were made with a specially designed pair of moderately elastic steel calipers having one slightly curved arm which easily slips under a recumbent patient, the other arm being more curved to meet the front of the sternum. With such calipers there is no difficulty in obtaining reliable measure-

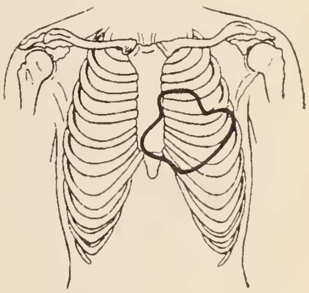

Fig. 7.—Area of systic mitral murmur after acute rheumatism. The murmur was inaudible in the erect position.

ments of the anteroposterior diameter of the chest. The change in depth is worth bearing in mind, because it helps to account for some of the changes in the cardiac physical signs. When it is remembered that practically half of the anteroposterior depth of the chest consists of the tissues of the back, the spine, the aorta and esophagus, together with the sternum and its coverings in front, it will be seen that five eighths of an inch is a considerable fraction of a remaining three and a half inches. The x rays suggest that the heart flattens slightly in recumbency, becoming somewhat broader from side to side.

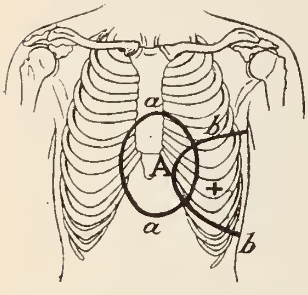

Fig. 8.—From a case of mitral stenosis. The outline aa, area of systolic murmur; A, its point of maximum intensity. The shaded area bb, area of presystolic murmur; + position of apex beat which drops in erect position.

MURMURS.

Here three sources of error have to be avoided. The effect of exertion must be eliminated by having the patient's posture changed for him by an attendant from recumbent to sitting and vice versa, without any effort on the patient's part. Any transitory effect of the change must be given time to pass off —a few seconds seem sufficient. Alterations in the adjustment of the stethoscope are to be avoided by using only the straight wooden stethoscope.

So ascertained, the effects may be briefly stated thus.

ORGANIC MURMURS.

Mitral regurgitant, tricuspid regurgitant and aortic forward murmurs are usually louder and more widely audible in the recumbent posture than in the erect, indeed are sometimes only audible in recumbency. Aortic regurgitant murmurs, on the other hand, are very little altered either way. Mitral stenotic murmurs are generally changed in the reverse direction, being usually heard more loudly and widely in the erect position than in the recumbent, indeed are occasionally only audible in the erect position. One of the loudest presystolic mitral murmurs I have met with was scarcely audible in recumbency. Figs. 7, 8 and 9 illustrate these points.

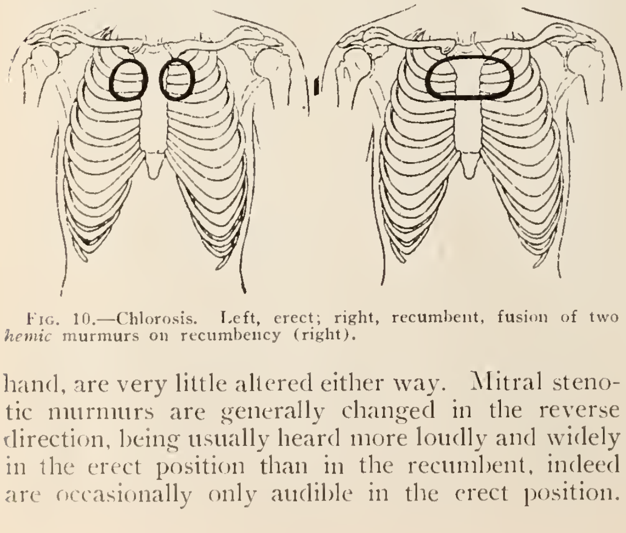

Fig. 10.—Chlorosis. Left, erect; right, recumbent, fusion of two *hemic* murmurs on recumbency (right).

HEMIC MURMURS.

Pulmonary, aortic and apical hemic murmurs are always, in my experience, louder and more widely heard in the recumbent than in the erect position, sometimes to a remarkable extent, especially the murmur in the pulmonary area, which probably increases in loudness more than the common organic murmurs do. When the areas of audibility of two or more of these murmurs, present in the same patient, are separate in the erect position, there is a tendency to fusion when the patient assumes a recumbent position.

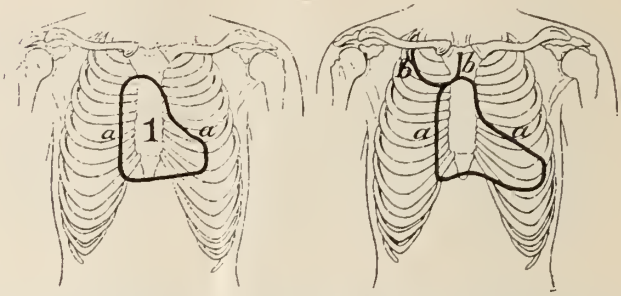

Fig. 9.—Aortic disease. The aortic regurgitant murmur was, if anything, rather fainter in recumbency. The aortic stenotic murmur was not heard in the erect position. aa, Area of aortic regurgitant murmur; bb, area of aortic stenotic murmur.

The venous hum in the neck, on the other hand (although not a cardiac murmur, it is desirable to consider is here, as it enters into the explanation), is better heard, sometimes only heard, in the erect posture. Figs. 10 and 11 illustrate the changes in these murmurs and the fusion to which reference has just been made.

EXPLANATION.

On change of posture the loudness of the murmurs must tend to be modified by the coincident changes in the relations of gravity to the intracardiac bloodcurrents. Compare Figs. 12 and 13. Sir Clifford Allbutt has explained the effect of posture on the venous hum as due to the action of gravity. For the application of gravity as part explanation of the cardiac murmurs I must assume responsibility (1). In the erect position gravity must aid the auricle in driving blood into the ventricle and so increase the presystolic murmur of mitral stenosis, and oppose the ventricles in driving blood from the ventricles

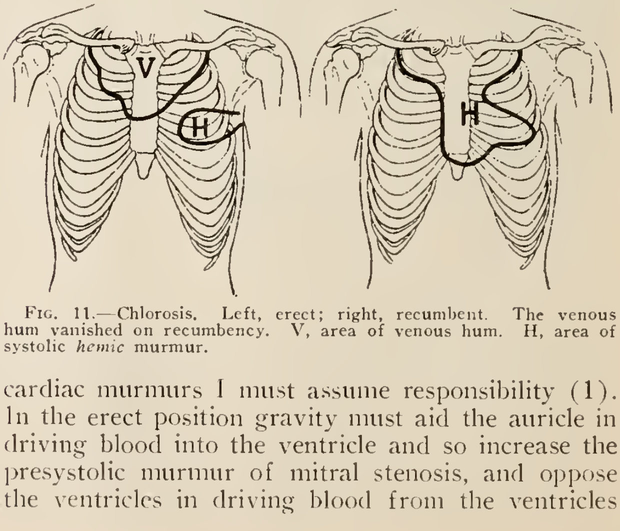

Fig. 11.—Chlorosis. Left, erect; right, recumbent. The venous hum vanished on recumbency. V, area of venous hum. H, area of systolic *hemic* murmur.

back into the auricles or forward, on the left side, into the aorta, so diminishing the systolic murmurs of mitral regurgitation, tricuspid regurgitation and of aortic stenosis. In the recumbent position, on the other hand, gravity must aid the ventricle in driving blood back into the auricle, thus increasing the systolic murmurs of mitral and tricuspid regurgitation, and from the left ventricle into the aorta, thus increasing the systolic murmur of aortic stenosis, while it must oppose the auricle in driving blood into the ventricle, and so diminish the presystolic murmur of mitral stenosis. So far there arises no serious difficulty. But aortic regurgitation forms an exception. It is, however, also an exception in mode of origin, viz., in not being due to the driving force of the musculature of the heart; its driving force is the blood pressure in the aorta; when the patient is erect, the effect of the vertical position of the descending aorta must come into play, and gravity acting upon the blood in that vessel must tend to more than counterbalance the effect of gravity on the regurgitant flow from the much shorter ascending aorta; so that gravity does not tend to increase (but may tend to decrease) the murmur of aortic regurgitation on assuming the erect position.

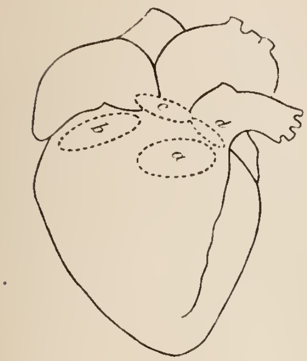

Fig. 12.—Diagram of the heart, seen from the front in the erect posture, showing the valvular orifices as they would probably appear in perspective if the heart were transparent; a, mitral orifice; b, tricuspid orifice; c, aortic orifice; d, pulmonary orifice.

If anyone doubts the power of gravity to affect a fluid current thrown by muscular action, let him test its effect with an ordinary four ounce india rubber bottle syringe full of water, held under water in a deep vessel. If with the right hand holding the syringe a jet be thrown obliquely downward against the left hand placed under the water an inch from the nozzle, and afterwards with the same manual force and at the same depth a jet be thrown obliquely upward against the left hand held at the same distance, the observer will have no difficulty in detecting the greater force of the current thrown downward.

Another factor in the change of posture is the change of chest depth. All that I think can here at present safely be said is that, in some case of accentuated pulmonary second sound, the front wall of the chest is brought nearer to the pulmonary valves, as the shock of their valve closure can be felt in recumbency, although it cannot be felt in the erect position. If the pulmonary murmur of anemia be produced, as one supposes, at this orifice, its frequently remarkable increase on recumbency may be partly due to the greater nearness of the orifice to the listening surface. Also that, if the pulmonary orifice is brought nearer the surface in recumbency, the aortic, which is attached to it, must likewise be brought nearer.

CARDIOPULMONARY MURMURS.

Although these are not circulatory murmurs at all, being wholly exocardial, they may be mistaken for true cardiac murmurs. They are believed to be due to air beaten out of an edge of lung by the beat of the heart, causing a puff sounding like a systolic murmur. They are distinguished by being best heard (often only heard) in one phase only of respiration, inspiration or expiration, being obliterated if the breath be held in the opposite phase, by being located over an edge of lung, and by not being conducted as the corresponding heart murmur would be conducted. They are characterized, as regards posture, by being usually much louder either in the erect or recumbent position—usually in the erect.

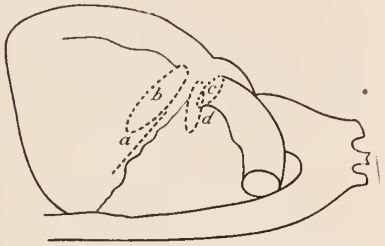

Fig. 13.—Diagram of the heart seen from the left side in the recumbent posture, showing the orifices as in Fig. 12; a, mitral orifice; b, tricuspid orifice; c, aortic orifice; d, pulmonary orifice.

Such is the received account, but two recent observations suggest the need of caution in concluding that the above relation to respiration necessarily negatives the idea of a murmur being endocardial. I have found that a very slight aortic regurgitant murmur in young subjects may be obliterated in deep held inspiration in either position. (3) And I have lately heard a musical systolic apical murmur (musical murmurs are generally believed to be endocardial) which disappeared in the same way.

NOTE ON RARER MURMURS.

The following have been too rarely seen to form a basis for any general statements. The murmur of pulmonary stenosis (congenital) has been in my experience so loud as to make postural differences difficult to be sure of. That of pulmonary regurgitation (several times diagnosed in malignant endocarditis) needs postmortem confirmation, and that unluckily I have so far been unable to obtain. The murmur of perforate septum ventriculorum has, like that of pulmonary stenosis, proved too loud. The continuous hum of patent ductus arteriosus in one instance became discontinuous on recumbency, but in another instance posture made no difference. I have had no opportunity of observing the effect of posture on the murmur of tricuspid stenosis.

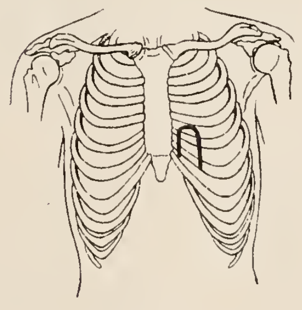

Fig. 14.—Reduced area of cardiac dulness in recumbency from a case of gastric carcinoma.

THE NORMAL HEART SOUNDS.

The statement in the GENERAL SUMMARY and Fig. 1 suffices for a description of these sounds.

EXPLANATION.

I have explained this change as probably due to the different action of gravity on the blood in contact with the valves (2) (see Figs. 12 and 13). The heart not being rigid, in the recumbent posture some weight of blood rests on the auriculoventricular valves, but none on the pulmonary valves (the aortic valves have less simple relations to gravity as just pointed out). In the erect posture no weight of blood rests on the auriculoventricular valves but some weight may be assumed to rest on the pulmonary valves.

THE ACCENTUATED AND THE REDUPLICATED SECOND PULMONARY SOUND.

The accentuation and reduplication are as abovestated in the general summary most marked in recumbency: the reduplication may only be heard in recumbency.

EXPLANATION.

In recumbency the front chest wall, as has been said, is at least in some cases of accentuated pulmonary second sounds nearer to the pulmonary valves, and their closure is then palpable, which is not the case in the erect position. Moreover, this closure can, in reduplication, sometimes be felt to be double, proving that the reduplication in such cases at all events is due to asynchronous closure of the pulmonary cusps—not to asynchronous closure of the aortic and pulmonary valves, as has been generally taught.

PERICARDIAL FRICTION.

It is generally known that the rub of pericarditis may be lost on sitting up, although well heard in recumbency. But it is not generally known that this may be of diagnostic help. I have recently listened to a heart in which over the base there was a double sound which might either be murmurous or frictional. The diastolic portion could only have been due, if murmurous, to well marked aortic regurgitation. So the diagnosis was easy. For if the sound were lost in the erect position, it could not be a murmur of aortic regurgitation, which never disappears with change of position. The sound vanished on sitting up and therefore clearly was due to friction, a conclusion entirely borne out by an attendant phenomena.

PERICARDIAL EFFUSION.

The dulness has long been known to be wider in the erect than in the recumbent posture.

HYDROPNEUMOPERICARDIUM.

The diagnosis largely turns on the postural changes in the physical signs. In recumbency, as might be supposed, the distribution of air and fluid is markedly altered.

THE CARDIAC SIGN IN CANCER.

One very valuable byproduct of this work in posture is the discovery that in certain cases of cancer, especially in cancer of the digestive organs and in their later stages, the recumbent cardiac dullness is remarkably diminished (to under two inches or, more typically, to one inch or less, Fig. 14)—or even altogether lost. This cardiac sign is of great use in the diagnosis of obscure cases of cancer. It has however been so amply dealt with in former papers (4) that here I merely refer to it as a postural change in cardiac physical signs.

EXPLANATION.

In these cancer cases two coincident phenomena will be observed, viz., 1, a loss of elasticity in the tissues—as often strikingly shown in the abdominal skin—and 2, a singularly feeble and, as it were, imperfectly filled pulse. If we assume that the lung tissue is as inelastic as the skin, a spurious emphysema is to be expected to develop, and has, as a matter of fact, been observed postmortem by Dr. W. S. Fenwick. At the same time a limp and imperfectly filled heart with lax attachments would tend to drop back from the front wall of the chest more than a normal one. Also, in some cases of cancer, the heart has been observed to have wasted remarkably.

DISTANTLY HEARD FIRST SOUNDS.

I have suggested that the presence of a markedly "distantly heard" first sound should make one think of Graves's disease. The fact therefore that a distantly heard first sound is sometimes much more distantly heard on recumbency has some value.

CONCLUSION.

In conclusion I would like to point out some important differences in value between modes of auscultation to which I have recently ventured to draw attention as they bear on the subject of this paper. In lung diseases the double stethoscope is indispensable, because it can penetrate further than the wooden one and pick up adventitious sounds which would be missed without it. In heart diseases a double stethoscope helps to determine the presence of mitral systolic murmurs too faint to be sure of with the wooden stethoscope. But (a fact not to be forgotten) a slight aortic regurgitant murmur, distinct to the wooden stethoscope, may actually be inaudible to the double stethoscope. Lastly, there are some very faint aortic regurgitant murmurs impossible to be sure of with either stethoscope, which can only be made sure of by an ear laid directly on the chest, or with only some thin fabric intervening.

REFERENCES.

1. GORDON, W.: Posture and Heart Murmurs, *British Medical Journal*, 1902, vol. i, p. 636. It will be seen that I have since somewhat modified the explanation then given, though broadly it remains the same. Also, Bodily Posture and Cardiac Physical Signs, *Lancet*, 1907, vol. ii, p. 356.

2. GORDON: The Influence of Posture on the Normal Cardiac Sounds and on the Normal Cardiac Dulness, *Transactions of the Royal Medical and Chirurgical Society of London*, 1906. Also, see *Lancet*, 1907, vol. ii, p. 356. Bodily Posture and Cardiac Physical Signs.

3. *Idem:* The Effect of a Deep Inspiration on the Murmur of Slight Aortic Regurgitation in Young Subjects, *British Medical Journal*, March 2, 1918.

4. *Idem:* The Cardiac Dulness in Cases of Cancer, *Transactions Royal Medical and Chirurgical Society of London*, 1904, and The Value of the Cardiac Sign in Cancer, *Lancet*, January 17, 1914

5. MACALISTER, A.: *Textbook of Human Anatomy*, p. 317.

3 BARNFIELD CRESCENT.

Aortic Incompetence

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SURVEY OF THE LITERATURE ON AORTIC INCOMPETENCE.

Occasionally aortic regurgitation has been diagnosed in infants, and the evidence of this lesion has been found at autopsy on the stillborn and those infants who have succumbed to such structural defects, as: absence of aortic valves, supernumerary valves, hematomata, emboli, foramina or fenestrations upon or in these valves, strands of endocardial remnants that hang into the ventricle from the surface of the valve leaflets, etc. Occasionally, too, hypoplasia, hypertrophy, macrocardia and microcardia cause a definite aortic defect. Rarely do parasites attack the valve area causing their insufficiency; it is more usual to find such organisms as the echinococcus cysticercus, or pentastomum in the walls of the myocardium. The etiology that is usually looked for hardly includes these causes, nor does one often think of new growths, either primary or secondary, that may so distort the ventricular cavity as to cause an insufficiency of the valves; they do occur, however, and it is well to bear them in mind, and in certain types of cases to be suspicious of their presence.

Aortic regurgitation *per se* is definable as a lesion of the aortic valves, allowing a reflux of blood into the left ventricle during diastole.

Following closely upon the researches of Cowper in 1705, Viussens ten years later and Hodgins in 1829, all of whom suspected the mechanics of this lesion, Sir Dominick Corrigan established the clinical entity of this ailment as "permanent patency at the mouth of the aorta."

The usual clinical findings as to etiology are: luetic and nonluetic intoxications. Under this latter group are included: rheumatic fever, septicemias, bacteriemias, late scarlet fever, streptococcal invasions, gout, alcoholism, plumbism (now not so frequently seen), typhoid and typhus fevers and also those factors that tend to produce a general or local sclerosis arteriæ. Chorea, according to Holt's figure, produces this lesion in about three per cent. of the choreic cardiac cases among children.

Exocardiac causes include such pathological conditions as: mediastinal tumors that distort the aortic lumen, atheromas that descend to the leaflets of the aortic valves, causing their puckering, adhesion or other deforming incompetence. Aneurysm of the aortic arch may so encroach upon the valve area as to promote insufficiency through dilatation.

Injury has been cited as the sole factor in the sudden tearing of an aortic cusp, but most probably a preexisting sclerosis or degeneration predisposes to the trauma. It is impossible to rupture a normal valve experimentally by subjecting it to the highest pressures that are ever reached in the animal economy.

Aortic regurgitation is usually found in the hearts of robust adult males, generally past middle life, in whom the existence of a localized or general sclerosis is evident. There are exceptions to this ruling, for in children and young adults rheumatic fever exacts a heavy toll with this lesion. In many instances it is met with in young men or women where the history of lues can be elicited, or in whom a Wassermann test confirms our suspicions. The predilection of aortic damage is for that type of patient whose habits entail habitual strain or in whom lues has found an youthful host. Long latent periods are not infrequent before damage due to lues begins to show its effects.

Females acquire this lesion in a negligible nonluetic percentage where also infection can be ruled out; and it may be due to the adaptability of the female generative tract to accept under strain an increased volume of blood which otherwise would dam back into the arterial roots. Perhaps, too, the periodic reduction in blood volume, even if partial, during menses, certainly must affect blood volume. It seems that women can and do perform as arduous and constant labor as men. These figures are interesting: all the cases of aortic incompetence as compared with all cases of endocarditis measure only 8.4 per cent. in women and 28.5 per cent. in all valve lesions in men, about three and a third times as many.

SYMPTOMATOLOGY.

Possibly by placing the symptoms under two headings they are better available for study. There are a, cardiovascular symptoms, and, b, generalized or systemic signs. These patients have more or less characteristic faces. Palpebral slits wide, pallor, bluish conjunctivæ and a peculiar thickness of the neck that may at a hurried glance suggest exophthalmic goitre; on closer examination, pulsating carotids, throbbing head and possibly some superficial vessel, as it pulsates characteristically, put our inquiry along the proper channel. These patients all complain of practically the same group of symptoms, almost a syndrome, comprising tachycardia, anginal pains, cervicobrachial neuritis (?) and throbbing carotids. Tachycardia, often paroxysmal, seems to bear no relation to the amount of strain, for it may come on when the patients rise from a chair, and it may not be induced by climbing several flights of stairs.

Precordial pains, often severe, and frequently nocturnal, are described as a dull boring or at times as a quick lancinating pain, radiating up into the neck and down the left arm (cervicobrachial neuritis). How this pain originates is difficult to determine. Anatomically the heart and aorta are rich in nerve and ganglion plexuses and filaments are found penetrating deeply into the midcoat of the aorta.

Headache, mostly of the temporal throbbing type, is often severe. Vertigo is a common complaint and may be the only prodrome for years before decompensation brings other signs in its wake. Both are probably due to the alternate hyperemia and ischemia in the circle of Willis. Muscæ volitantes are frequently complained of.

Insomnia, also a frequent symptom, is usually found among those patients with high pressure and where neck pulsations are marked. Or there is sleep, but it is disturbed by frightful dreams, no doubt occasioned by the suboxidation of the brain circulation.

Dyspnea need not be distressing and, in a surprising number of cases, is not complained of. With decompensation, however, it becomes more and more marked, giving way to orthopnea and even acopnea. Where pulmonic congestion exists, there is of course cough, because it is due to an active hyperemia that produces a frothy, often bloody, sputum.

Pupillary inequality has been found in a high percentage of cases, whether luetic or not, and is perhaps due to celiospinal reflex. It is especially seen in aneurysm cases.

Splenic pulsation, accompanied by pain, is more frequent in the later cases, where decompensation is progressive. This is part of a visceral congestion which accompanies practically all decompensations.

Violent arterial throbbing is characteristic and is present in every case. The flushing of the skin and a moment after the sudden ischemia of the capillaries is familiar to all. In some of the larger arteries that lie superficially, one can often see the rhythmic displacement and elongation, especially if the vessel be tortuous. Venous pulsations, brought about by the forceful arterial surge are, in rare instances, seen on the back of the hands or in other superficial veins. The ophthalmoscope also shows this tortuosity and pulsation in the retinal vessels.

Toward the close, mental symptoms consisting of morbid impulses, suicidal tendencies and melancholia make their appearance.

PHYSICAL EXAMINATION.

Inspection.—The diffuse and forceful apex beat, causing the precordium to bulge with each systole, frequently visible in the sixth intercostal space, may often be traced, with the proper shadows, well outside the left mammillary line and even as far as the left anterior axillary line.

Palpation.—Pressing the hand over the precordium, one is surprised with what force the heart's action resists and raises it with each systole. Sometimes a thrill between systoles is felt. Under the examining fingers the pulse is pathognomonic. It is well, however, to recall a similar pulse which is met with in sclerotic patients with high blood pressure but no endocardial lesion. The pulse of aortic incompetence rises and strikes the examining fingers with shot like impact, and suddenly collapses. This is repeated in the findings upon other arteries of the body.

Auscultation.—The cardiac area for considerable distance transmits the sounds of the heart, but they are dull and not distinct. On listening to the second cardiac sound, a loud swishing or often musical murmur is heard. Its auscultatory locus is usually the third interspace to the left of the sternum. A short systolic murmur is also heard over the aortic site (second right interspace) and is due to the regurgitant stream meeting the new output from the ventricle at systole.

At the apex the sounds are peculiarly indistinct and when one thinks of the huge hypertrophic hearts in these cases, one at once wonders why the sounds should not be louder. The mechanism that prevents it is caused by the overfilling of the ventricle during diastole so that, when its contraction time comes, it cannot recoil with sufficient force to produce a good clear sound.

A rather frequent presystolic murmur or rumble is heard over the mitral area. In explanation of this, Austin Flint taught that, owing to the enlargement of the ventricular cavity, the anterior cusp of the mitral valve was displaced (during diastole) from the wall of the ventricle and as regurgitation from the aortal valves plus the normal influx of blood from the mitral occurred, the two streams met and thus a swishing presystolic murmur was created. A third heart sound to which Thayer called attention is quite frequently heard at the mitral area. Diastolic in time and of a short galloping nature, or click, it is due to the forceful closure of the mitral valves because of the disproportionate forcefulness of the ventricle in its action.

When the diastolic murmur over the base of the heart is loud, but not loud over the carotids, the leak is small. When the murmur is not loud over the base but is quite loud over the carotids, then the leak is large. Occasionally the murmur can be elicited along the spine at about the fourth dorsal vertebra.

MECHANICS.

As to the mechanics of this lesion, with the present diagnostic acumen, aided by the more reliable studies with polygraphic, electrocardiographic, orthodiascopic and skiagraphic correlation, much of our understanding as to the mechanism of the elements that make up this incompetence seems accurate.

In insufficiency of the aortic valves, the blood which has been sent forward into the aorta by the contraction of the left ventricle returns in part to the left ventricle again, through the aortic valves during the ensuing diastole (during the aortic systole, so to speak). Thus, unless the ventricle adapts itself to the regurgitated amount of blood, plus that which it must accommodate from the lungs via the left auricle, a marked interference with ventricular rest results. Cardiac tonicity, intrathoracic pressure, extent of the lesion and sustained power of the left ventricle are the factors that prevent pulmonary congestion.

The left ventricle must hypertrophy, therefore, not only in muscle substance but in cavity as well, in order to accommodate and accept the increased amount of blood that flows into it. Where a major degree of arteriosclerosis exists, the arteries do not completely expand, nor is their propulsion wave during systole even, or of sufficient force. Also the vessel wall does not recover its narrower lumen promptly, when intracardiac pressure falls during diastole. This in itself constitutes a vicious cycle, but the fortunate characteristic of the cardiac muscle to hypertrophy immensely, and on the side of the arteries the equally fortunate factor, that arteriosclerosis is a slow process, help to maintain compensation for a long time.

Adnexal and distant organs receive an uncontrolled volume of blood with each systole and because of the increasing inelasticity of the arterial tree, regurgitation goes on up to the capillaries. The veins manage to carry off a greater part of the blood, so that blood interchange remains fairly good, or at least of sufficient physiological usefulness to prevent cyanosis, or other gross chemical disturbance. This of course applies to those cases where compensation is holding its own. Grossly also, nourishment of organs remains unusually good, because as the contraction of the immensely hypertrophied ventricle attempts to overcome the regurgitation loss, it empties itself with sufficient force to throw its quota of blood high into the aortal arch and beyond. The boundaries which the heart is capable of trespassing in its effort to stabilize disturbed function are astounding. For example: Keen in 1900 at Pennsylvania reported a case of ruptured aneurysm of the abdominal aorta, in which the vessel was tied at a point immediately below the diaphragm. The patient survived forty-eight days. Other surgeons had practically as brilliant results in similar cases in which the ligation of the aorta was followed by survival of eleven and thirty-nine days respectively.

On seeing some of the hearts in aortic cases at autopsy, with their huge papillary muscles and their markedly hypertrophied chordæ tendinæ, it does not seem so difficult to understand the work they are capable of performing.

Gradually, however, as the ventricle hypertrophies to such an extent as to encroach upon its fellow, the mitral valve also becomes incompetent. It now becomes larger and larger; even the great strength of the annulus fibrosis (aortic ring) gives way under the terrific strain of such a bulky heart, atheromatous changes occur in the aorta, the lumen of the vessel becomes more and more distorted and decompensation soon follows. Or, in those cases where sudden death ensues (and in this ailment they are very frequent) the heart has not been able to cope with the everincreasing regurgitation and the ventricle suffers an acute paralysis (asystole); or rupture of the heart follows; or coronary thrombosis, pulmonary embolus or apoplexy result. At autopsy the left ventricle is found in diastole, choked in blood.

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Tumors of the Heart

With a Report of Ten Cases of Cardiac Tumor

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Tumors of the heart are very uncommon; primary growths are rare; primary sarcoma of the heart is a rare finding. Secondary (metastatic) neoplasms of the heart are more common than primary tumors, and secondary carcinomas are more frequent than sarcomas. I wish to report a case of primary sarcoma of the heart, because of its rare occurrence, and to include the reports of nine cases of secondary malignant tumors of the heart and pericardium.

The late Dr. Perlstein, of Chicago, in his review of the subject of tumors of the heart (1918), reported a case of cardiac sarcoma which originated in the subpericardial areolar tissue, in a man aged forty-three. He was able to find only thirty cases of sarcoma of the heart after a careful search of the literature. He concluded that there is no characteristic clinical picture for the condition. The symptoms are mostly those of seriously disturbed cardiac activity. Excessive and repeated hemothorax was the most striking clinical feature of his own case. Sarcomas of the heart occur at all ages, but are most common in the vigorous years of life. Histologically all types of sarcoma have been reported, the spindle cell sarcomas being found most frequently. They occur more often in the auricles than in the ventricles and more frequently on the right than on the left side. Pericardial and pleural effusions and edema are common.

Perlstein states "of the various organs of the body the heart is the least frequent site of primary neoplastic change." Tumor of the heart has never been diagnosed, *intra vitam,* according to Perlstein, nor in the literature I have reviewed.

In reviewing the literature he found that more than a hundred cases of primary tumors of the heart have been reported, but many of these were not primarily in the heart, and many were not true tumors. Adami states that "The heart above all organs is constantly in a state of great efficiency, well nourished, well innervated and functionally always active, so that it is less likely to take on aberrant growth."

Cases of sarcoma of the heart and pericardium have been reported by Bodenheimer (1865), Hottenroth (1870), Birch-Hirschfeld (1876), Fraenkel (1889), (1901), Redtenbacher (1889), Juergens (1891), Raw (1898), Fuhrman (two cases 1899), Geipel (1889), Lambert (1898), Drysdale (1903), Kaak (1904), Crescenzi (1906), Schoeppler (1906), Erickson (1908), Escher (1909), Link (1909), Baldwin (1910), Sternberg (1910), Meroz (1911), Ehrenberg (1911), Menetrier (1911), Tobieson (1912), Horneffer and Gautier (1913), Binder (1914), Perlstein (1918).

Perlstein doubts whether the cases reported by Impacciante and Williams and Miller are primary sarcomas. He considers them both as instances of mediastinal sarcomata. Zanders's case he considers a fibroma, although in some places the cells were spindle shaped and the structure approached that of a spindle cell sarcoma. Crawford's case he believes to have been a blood clot. Bramwell's case is mentioned as a secondary sarcoma of the heart. Most writers class Wiegand's myxosarcoma hematodes as a myxoma, similar to Salvioli's case. While Fraenkel considers Prudhomme's case as a primary sarcoma, Perlstein classes it as a secondary melanotic sarcoma. Thorel considers Meroz and Menetrier's cases of sarcoma of the heart as doubtful. General sarcomatous infiltration of the myocardium was present in Lambert's and Drysdale's cases. Schöppler's case showed a general sarcomatosis of the epicardium, the entire heart being enveloped in sarcomatous tissue. Tobieson's case showed sarcomatous infiltration chiefly of the pericardium, as was present in Broadbent's case.

Metastatic growths in the heart have occurred from malignant neoplasms originating in the eye, the breast, stomach, penis, uterus, and other parts of the body.

Albers probably reported the first authentic case of a primary tumor of the heart in 1835—a fibroma, first called by him a primary cardiac chondroid.

Theophy Boneti (1700) and Morgagni (1762) reported tumors of the heart. Perlstein believes that the first cardiac sarcoma was reported by Bodenheimer in 1865, in his dissertation (Bern). Hottenroth's case was reported in his dissertation (Leipsig) in 1870. The patient was a female, aged seventy-nine. It was a giant celled sarcoma, the size of a hen's egg, affecting the right auricle with no metastases.

Bodenheimer's patient was a man, aged forty-four. The sarcoma involved chiefly the right auricle with no metastases. Right pleural effusion and pericarditis with effusion were present.

Juergens reported a fibrosarcoma involving mainly the right auricle, in a man aged thirty-six. Kaak's patient was a man aged twenty-seven. The tumor was a myxocystosarcoma. The cystic tumor was in the upper part of the pericardium, connected with the pericardium and the large veins. There was bilateral pleural effusion; ascites and edema were present. At second thoracentesis 1,700 c. c. of yellowish fluid was removed. This case was reported in his dissertation (Kiel) in 1904.

Binder (1) reported a pedunculated spindle celled sarcoma, the size of a walnut hanging down from the right auricle into the vena cava. There were no metastases. The patient was a man aged thirty-three. He complained chiefly of dyspnea, and edema of the face, chest and legs. Ascites was not present. Bilateral pleural serous effusion was present.

Fuhrman's two cases were reported by him in his dissertation (Marburg) in 1899. One case occurred in a girl aged seven, who died suddenly, having had a slight headache for two days previous to death. There were no other symptoms. The tumor, which was a spindle celled myxosarcoma, involved the aortic valve, obliterating the right coronary artery. There were no metastases. The other patient was a man aged thirty-four. His chief complaints were palpitation of the heart, cough, weakness, dyspnea, fatigue. No murmurs were heard; edema was not present. The tumor was a spindle celled sarcoma with giant cells, affecting chiefly the left auricle, obliterating the left pulmonary vein, a small neoplastic nodule the size of a bean was present on the mitral valve. Justi reported this case as a myoma. There were no metastases.

Weiss (2) reported a large round cell sarcoma chiefly involving the right auricle, in a man aged thirty-eight. The tumor with the heart and the obliterated pericardium was the size of a child's head. Metastases were present in the lungs and pararenal tissue. The chief symptoms were cyanosis, palpitation, dyspnea and edema. Left pleural effusion.

Perlstein (3) reports an interesting case of mediastinal mixed celled sarcoma, affecting the pericardium. A well defined tumor originating in the subepicardial areolar tissue, located essentially between the heart and epicardium, invading the pericardium and fat. There were metastases in the pleura and mediastinal lymph nodes. The chief symptoms were dyspnea, cough, perspiration, restlessness, thirst, weakness and the most striking feature of the case was the excessive and repeated hemothorax. A total of 15,350 c. c. of bloody fluid was removed from the left thoracic cavity—from 450 c. c. to 2,700 c. c. (ten specimens altogether) at a time. The white blood count varied from 21,800 to 134,000, the red blood count went from 5,696,000 down to 2,203,000 several days before death.

Sternberg reported an instance of spindle celled sarcoma involving the wall of the left ventricle, and the left and right auricles. The right pulmonary vein was completely filled with neoplastic tissue. Metastatic growths were present in the tail of the pancreas. The man was fifty-eight years old, the chief symptoms were dyspnea, edema (ankles) and cardiac enlargement.

Bryant found ten cardiac tumors among 2,942 autopsies at the Johns Hopkins Hospital. One sarcoma, lymphosarcoma, two epitheliomata, one endothelioma, and four carcinomata. Karrenstein found fifteen metastatic cancers of the heart and four secondary sarcomata from 1903 to 1907 among 6,655 autopsies performed at the Pathological Institute of the University of Berlin.

Joel's (1890) case was a teratoma of the heart; the tumor was within the pericardial cavity attached to the pulmonary artery where it leaves the heart. F. C. Wood says "many of the socalled tumors of the valves, however, are to be viewed with suspicion, some are undoubtedly examples of Lambl's excrescences—nonvascular papillary projections of hyaline material interspersed with connective tissue and degenerated elastic fibres, and covered with endothelium." He states, "one of the most common among the rare primary growths of the heart is the myxoma." There is considerable doubt regarding the true nature of this lesion, as it may be an organized thrombus or inflammatory proliferation and some refer it to congenital syphilis and describe it as a myxogumma (Warthin). Wood (4) in his textbook refers to the sarcomata reported by Sternberg, Fraenkel, Binder and Drysdale, and the papers by Hagedorn, Meroz, Napp and Link.

Geipel (5) reported a case of round celled sarcoma involving the right auricle of the heart and right wall of the right ventricle. There were no metastases.

Lambert's (1898) patient was a man aged thirty-nine. He had bilateral serous effusion, cyanosis, ascites, pericardial effusion and edema (of upper part of the body). The tumor, a small round celled sarcoma, infiltrated the pericardium and myocardium. Metastases were present in the pancreas.

Schäfer reported two cases of lymphosarcoma of the heart (Greifswald 1911, H. Adler). Jacobson (1911) and Hanser (1912) have reported primary tumors of the heart, as have also Dean and Falconer (1913-14). Hedenius and Henschen (1913) reported a metastatic sarcoma of the heart.

Oppenheimer and Ehrenreich (1912) reported a pedunculated cardiac polyp before the New York Pathological Society. Pelissier (1912), Marten and de Crespigny (1921), Deve (1916), Mancini (1917), and others reported hydatids of the heart.

Schusterowna's (1912) patient, a newborn infant, had an angioma cavernosum in the heart. Weber's (6) (1907) two cases of varicos cavernösen tumors of the septum atriorum are reported. Bryant (7) reports a primary sarcoma of the heart in a dog. Nicohols (1908) reported angeiomata in the heart valves of a newly born infant. Haeberlin (1908) found two cases of aleucemic lymphoma of the heart.

Ely's (8) patient died suddenly after suffering for some time with socalled bronchitis. Sarcoma of the anterior wall of left ventricle was found, with no metastases. The man was twenty-eight years old.

Menetrier's (9) patient was aged thirty-five. The man had bloody pleural effusion, hemoptysis, edema, and dyspnea; infarcts in lung. Tumor found compressing right auricle—the myxosarcoma (with fusiform cells), was six cm. in diameter and located in the left auricle.

In Armstrong and Monckeberg's (10) patient, a child five years old, heartblock was due to a primary cardiac tumor.

Shulgin (1911) wrote on histogenesis of rhabdomyomata of the heart. Peters and Milne (1911) reported secondary tumors of the heart. Cleland and Palmer's (1920) case had carcinomatous pericarditis. Erkes (1910) reported a diffuse melanosarcoma of the heart. Castelli (11) reported a lipoma of the heart.

Meroz (1911) found three primary tumors among 3,000 autopsies. Two were *fibroclastomes hemorrhagiques* (organized thrombi?) and one was a sarcoma. In his thesis (Geneva), he reports the case of a woman aged fifty-five, who had pain in the left side; dyspnea; painful breathing; pleural effusion, edema of the lungs; mitral regurgitation. There was found at autopsy a spindle cell sarcoma, hen's egg in size, hanging down into the left ventricle through the enlarged mitral valve. No metastases were noted.

Schoeppler's (1906) patient was a woman aged seventy-six. Round celled sarcoma of epicardium, and the heart was enveloped in nodular irregular (sarcomatous) neoplastic tissue. Metastasis were present in the suprarenal glands.

Link (12), in his report of ninety-one cases of primary cardiac tumors, found twenty-four located in the left auricle, ten in the right auricle, fourteen in the right ventricle, and eight in the left ventricle; sixteen were valvular tumors; two were in the auricular septum. His own case of spindle celled sarcoma of the heart occurred in a young man aged twenty-three. He had pleural effusion, pericarditis; pain in the heart region, cough, dyspnea, and cyanosis. Röntgenograms showed increase in the shadow of the heart to the right and left in the upper part.

Fraenkel's (1901) second case was a mixed giant celled sarcoma at apex of right ventricle, without metastases.

Erickson's (1908) patient was a man aged thirty-six, having a fibrosarcoma in left auricle, with no metastases. The patient had symptoms of bronchitis and myocarditis.

Birch-Hirschfeld's (13) case showed a tumor which was the size of a walnut—a giant celled sarcoma, originating in endocardium and right auricle.

Fraenkel's (1889) case of spindle celled sarcoma of the right auricle of the heart occurred in a young woman aged eighteen. No metastases were present; 2,130 c. c. bloody fluid was aspirated (four times) from the pericardium. She had pleurisy with serous effusion, bloody sputum, weak irregular pulse; cyanosis, dyspnea and pericarditis with bloody effusion.

Wagner's (14) patient had a secondary carcinoma of the heart muscle. La Place and Karsner's case was a metastatic spindle celled sarcoma, reported before the Pathological Society of Philadelphia.

Patzdorff's (1913) case had a metastatic hypernephroma of the heart.

Baldwin (15) reported a case of a large spindle celled sarcoma originating from the margin of the pulmonary veins, left auricle chiefly involved. The patient was a man thirty-four years old.

Broadbent's (16) case of lymphosarcoma of the pericardium was in a man aged twenty-three.

Drysdale's (17) (1903) patient was a woman aged forty-three. She had a round and oval cell sarcoma of the pericardium and myocardium, and metastases in the liver.

Crescenti's (1906) patient was a child three years old. The tumor in the ventricular septum was a sarcoma globocellulare. The child had fever, a scarlet rash, bronchopneumonia and throat cultures showed diphtheria bacilli and streptococci.

Ehrenberg's case (18) was a man aged forty-nine. He had dyspnea, cyanosis, edema of the upper half of the body, head, and upper extremities. The röntgenogram showed heart shadow to right of sternum. The tumor, a polypoid giant celled sarcoma, filled the right auricle and neoplastic tissue filled also the venæ cavæ, and azygos (dextra).

Raw's patient suffered from continual pain in the chest for three and a half years; she had edema of the legs, dyspnea, ascites, hemothorax and other symptoms. The tumor extended from the right auricle to the under surface of the liver (through the inferior vena cava). It was probably a fibrosarcoma. Gregerson (1918) reported a tumor cordis. Louria's (1917) case was a polypoid myxoma of the heart, which he reported before the New York pathological Society.

Göttel (19) reports a case of primary sarcoma of the heart. Weltman (20) reported a case of primary cardiac tumor. Mönckeberg (21) reported a case of primary cardiac tumor in a child aged five.

Wolbach's case (1907-8) was a congenital rhabdomyoma of the heart. Hagedorn (22) wrote on primary cardiac tumors. Sawyer reported (1908) an osteosarcoma of the heart, and Brenner (1907) reported a case of hemangioelastomyxoma of the heart.

Azzurrini (23) reported a case of primary sarcoma of the heart. Horneffer and Gautier reported a case of myxosarcoma, involving chiefly the left auricle and reaching down to the mitral valve. The man, aged forty-three, had symptoms of bronchitis for two years; dizziness, dyspnea, vertigo, fainting spells, bloody expectoration, arrhythmia and pericardial effusion. There were no metastases.

Montagnon's (1907) case was a fibromyxoma of the heart. Brabant (1906) wrote on cancers of the heart. Penneman (1908) reported a hemangioendothelioma of the heart. Koechlin (1908) wrote on primary tumors and papillomatous growths of the heart valves. Hornowski (1908) reported tumors of the heart.

Abricossoff (1909) reported a case of multiple rhabdomyomata of the heart. Coffin (1909) recorded a case of cancer of the heart. Verliac and Morel's (1909) patient had a lipoma of the heart. Jaffe (1918) and Morton (1919) each reported myxoma of the heart. Pommay-Michaux and Boué (1919) reported a case of secondary sarcoma of the heart. Saltykow's (1911) case was a myxoma cordis.

Hisinger-Jägerskiold (1916) reported a congenital rhabdomyoma of the heart. Magnusson (1915) wrote on Cardiac Tumors in Domestic Animals. Raschke (1915) reported a case of round celled sarcoma in the heart muscle of a rinde.

Manifold (24) reports a case of cavernous angioma of the left auricular wall.

Weltman, Göttel, Perlstein, Gregerson, Louria, Cleland and Palmer, Williams, Meroz Narr Schupfer and a few others reported cardiac tumors during the past five or six years. Dinkler (1907) reports a case in which there was a neoplasm of the pericardium and heart muscle.

Narr (25) (1918) reported a case of endothelioma of the heart before the Pathological Society of Philadelphia. Hiess (1910) recorded a case of myxoma of the heart. Stahr (1910), de Vecchi (1909) and others reported tumors of the endocardium. Stahr (26) reported two endocardial tumors before the *Gesellsch, deutsch. Naturf. U. Aerzte*, 1909. Martin and Klotz (1910) reported a sarcoma of the heart involving the bundle of His. Allyn and Karsner (27) showed a specimen of metastatic large round celled sarcoma of the heart before the Pathological Society of Philadelphia. See Case IV, of my series.

Zuccola (1913) reports a fibromyxoma of the heart. Rehder (1914) reports a rhabdomyoma of the heart.

Williams (1915) reported a large round celled sarcoma of the heart, before the section of diseases of children, of the Royal Society of Medicine (London, 1915-1916, IX, 36-38).

Redtenbacher's (28) case was a young man, aged twenty-two, who had effusion in both pleural cavities; pericarditis; frothy expectoration, dyspnea, and ascites. The tumor was an angiosarcoma of the pericardium. Metastases were found in the right lung.

Escher in his Dissertation (Leipsig, 1909) reported a case of round cell sarcoma of the heart (involving chiefly the right auricle), with metastases in tracheal lymph nodes and suprarenal. The patient was seventy-two years old. She had dyspnea, edema of legs, edema of left arm and left chest.

Histologically, Perlstein lists the collected cases of sarcoma of the heart as follows: Spindle cell, ten; round cell, six; giant cell, four; myxosarcomas, three; fibrosarcomas, three; mixed cell sarcomas, three (including his own case); angiosarcoma, one, and lymphosarcoma, one—a total of thirty-one cases. Nineteen cases occurred in males and ten in females in Perlstein's series. Two of the patients were aged three years (Crescenzi) and seven years (Fuhrman). Three were aged seventy-two, seventy-six and seventy-nine years respectively. Tobieson's patient was a youth aged eighteen years. Radtenbacher's case occurred in a young man aged twenty-two years, while Broadbent's and Link's patients were young men, each aged twenty-three years.

The diagnosis can not be made clinically. The röntgenographic, fluoroscopic, and electrocardiac studies may be of some assistance.

Fraenkel believes the frequent recurrence of hemorrhagic pericardial effusion, to be a diagnostic symptom of cardiac tumor. Hoover, however, states that "it is either impossible or a matter of good fortune" to clinically diagnose tumors of the heart. Perlstein was unable (after a very extensive study of the literature of the world), to find a single instance, where a correct clinical diagnosis of cardiac tumor was made during the life of the patient. Myocarditis (4), pericarditis with effusion (2), intrathoracic tumor (1), cancer of the lung (1), mediastinal tumor (7), edema of the lung, aneurysm, pleurisy with effusion, etc., were some of the diagnoses made in the reported cases of cardiac tumor.

Jachia (1895), Jacobsthal (1900), Kinsman (1881), Kolisko (1887), Beadles (1883), Bertenson (1893), Berti (1901), Borkhoff, Bureau, Cantelli, Caron (1854), Cooper and Kingsford (1892), Deguy (1900), Genning (1899), Hartill (1886), Rolleston (1891), F. Raw (1898), Pic and Bret (1891), Pietroni (1887), Petrocchi (1887), Petroff, Petourand and Molière (1894), Pavlowsky (1895), Laisney (1895), Meyer (1900), Patella (1897), Waldvogel (1895) and others have reported tumors of the heart.

Grulee, Lugli, Taylor, Lisi, Masorcic, Calvert, Bosseljoon and a few others have reported echinococcus cysts of the heart.

Dr. Baldwin Lucke, Assistant Professor of Pathology, at the University of Pennsylvania, informs me that he recently had a case of primary rhabdomyoma of the heart (Blockley Hospital) and a case of endothelioma of the heart secondary to cervical lymph gland involvement, which occurred in the service of Professor Alfred Stengel, University Hospital; and a third case, with hypernephroma of the heart.

Fritz Schäfer (Griefswald, 1911) reported two cases of lymphosarcoma of the heart (metastatic), one in a man who had a large lymphosarcoma of the right side of neck, whose death was due to suffocation, the other in a twelve year old girl. He mentions a case that Grawitz had seen many years ago in a nineteen year old man (prisoner) in Berlin, and who had a lymphosarcoma of the thymus with metastasis to the heart, and refers also to the case reported by Kaufmann occurring in a young man aged nineteen in whom was found a lymphosarcoma of the left ventricle—metastasis from a mediastinal growth. Schäfer refers to cases reported by Janina Zniniewicz (Greifswald, 1911), Steckert (1905), Litten (1895), and Wintermann (1896).

Stockert's case of lymphosarcoma occurred in a man aged thirty-six, and is reported in his inaugural dissertation, 1905, Heidelberg.

Henry Louria (1917) showed a specimen of polypoid myxoma of heart a very rare tumor, before the New York Pathological Society—from a woman aged fifty-three, who was a patient at the Presbyterian Hospital. It occupied the left auricle practically filling the entire cavity. He refers to papers by Berthenson, Link, Ribbert and C. Thorel.

At a meeting of the Philadelphia Pathological Society, May 25, 1911, two cases of metastatic sarcoma of the heart were reported. In Allyn and Karsner's case (Case IV in my series), the primary tumor was in the soft mole, in the abdominal wall. In La Place and Karsner's case the primary tumor was an enormous ossifying periosteal sarcoma. The first was a large round celled sarcoma, giving rise to nodules in the epicardium, myocardium and endocardium in large numbers and one large nodule in the right auricle almost filling the cavity. The second case showed a tumor in the myocardium of the left ventricle at the junction of the auriculoventricular groove and posterior margin of the interventricular septum—it was a large spindle celled sarcoma.

F. C. Forel (29), of Morges, Switzerland, reports two cases of primary neoplasm of the cardiac valves, one, a woman aged sixty years, and the other a woman aged thirty-six years. He reviews the literature, referring to cases reported by Curtis (1871), Debove (1873), Guth (1898), Reitmann, Ribbert (1904), Leonhardt (1905), and Djewitzki (1906), and concludes that primary neoplasms of the cardiac valves exist, that they are very uncommon, small and usually of no import as far as clinical symptoms are concerned, and that three types have been found, viz.: fibroma, myxoma and endothelioma.

Cecil Williams (January 28, 1916) cites the case of a boy aged eight years, who was admitted to the hospital with a history of pain in the left shoulder joint. He complained of cough and much expectoration for six weeks, swollen eyelids, vomiting, orthopnea, and cyanosis. The heart showed metastatic infiltration by a large round celled sarcoma, the primary growth was probably in sternal periosteum. He mentions several cases of metastatic tumors of the heart quoted by Osler and McCrae (30).

Meroz (1917) (Geneva, Switzerland), was able to collect fifty-five cases of primary tumors of the heart from the literature. He intentionally omitted the cases of sarcoma reported by Weiss, Assurini, Hoffenroth, Birch-Hirschfield, and also the tumors reported by Jägers, Reitmann, Da Costa, Hermann, Ingram, Bramwell and Roberts. He states Virchow reported the first case of primary myoma of the heart, and there was also a secondary cancer of this organ. He reports (as stated elsewhere) a case of hemorrhagic fibromyxocystoma in a woman aged fifty-four, another in a woman aged fifty, and a third case which apparently was a spindle celled sarcoma of the heart in a woman aged fifty. He found the left heart—and the left auricle in particular, to be the seat of predilection for cardiac tumors. Out of a total of forty intracavitary tumors collected, seventy-five per cent. were in the left auricle, nine of which were near the foramen ovali, five were in the left ventricle and only one was in the right auricle and four in the right ventricle.

Leroux and Meslay (31) report their case of *sarcoma du coeur* in a man aged sixty-one, and include three illustrations. The heart weighed 600 grammes.

Stengel and Fox (32) state "primary tumors of the heart are extremely rare. Secondary tumors are more common. Organized pedunculated thrombi have frequently been mistaken for tumors."

Hektoen and Riesman (33) state "tumors of the heart muscle are rare. Carcinoma is always secondary; and sarcoma, with very rare exceptions, is also secondary." They mention Osler's remarkable case of sarcoma blocking the tricuspid orifice; the renal vein being filled with a sarcoma from a large tumor of the kidney. They also refer to Pawlowsky's review of polypoid growths of the heart.

Willey Norton, Mt. Clemens, Mich., reported a case of myxoma of the heart simulating bronchopneumonia. The soldier was twenty-nine years old, white. He says myxomata form about thirty per cent. of all primary tumors of the heart. He quotes from the articles by Link, Meroz, Bodenheimer, Fränkel and Petit.

Sellers Kennard (34), of New York, reports a case of primary tumor of the heart in an Austrian Jew aged forty-one years. The heart weighed 753 grammes. The tumor was situated in the apex of the heart and involved the wall of the left ventricle. The growth measured two and a quarter inches in length and two and a half inches in its greatest diameter. The tumor was probably a rhabdomyoma.

Richard Link (35) (Klink in Freiburg) divides the primary neoplasms of the heart into four groups. He groups his own case (a man aged twenty-three, who died May 15, 1906—spindle celled sarcoma of the heart) together with the cases reported by Bodenheimer and Justi in Group I—a total of three cases. In Group II he includes cases reported by Kottmeyer, Lorne, Bamberger, Boström, Virchow, Waldvogel, Martinotti, Pavlowsky, Thomson and Atchison (two), and Carosi—a total of fourteen cases—including cases reported by Gairdner, Locher and Burney Leo. In Group III he includes cases reported by Andral, Zander, and Ingram and in Group IV he includes the cases reported by Fraenkel, Bucquoy and Prudhomme; he then tabulates cases 24 to 91—including cases reported by Ponfick, Jesaka Seijiro, Lubitzsch (1905), Djewitzky (1906), Baumeister (1906), Tophan (1906), Hagedorn (1908), Breuner (1908) and Simmonds (1908). He includes a list of sixty-eight references to the literature on the subject of Cardiac Tumors.

(*To be concluded.*)

Editorial Articles

ON THE WRITING OF MEDICAL BOOK REVIEWS.

This is how the ordinary medical book review is written. The editor receives the book from the publisher. He gives it to a medical friend for writing the review. The friend skims the book. Then he sits down to write the review. He is not a trained book reviewer and he loathes writing anyway but he has accepted the book and he must come through. So he copies the title page including the author's alphabetical appendices, notes the number of pages and illustrations in the book, and the name of its publisher.

Then follows the pithy paragraph which is to tell the reading public just what it's all about. First, it is the proper thing to toss a delicate compliment to the author—not a superlative compliment but just a nice little one which creates the general impression of sincerity. Then one should touch lightly on the general field covered by the book, making expansive statement as to the advances which it is making. This is safe. The body of the review is easily made by referring to the chapter headings and the advertising pamphlets furnished by the publisher. Here the good old standbys like "is logically carried forward," "deserves special mention," "receives considerable attention," do yoeman service. Next the appearance of the book should receive a meed of praise and then comes the critical moment, the dramatic episode,—the reviewer must object to something! His criticism must not be too violent, it must be something really valid or so small that the author lets him get away with it without an argument. A misspelled word on p. 323 thus becomes a heaven sent opportunity.

The foregoing may appear fantastic but if the reader will scan the reviews of a few medical journals he will come to the conclusion that the picture is not greatly out of drawing. The average medical book review is a perfunctory insult to the intelligence of the journal's audience and taken by and large is worthless, even from the viewpoint of bookselling which undoubtedly does exercise a certain influence upon its creation.

Relatively few people can write a good medical review of any sort, only an expert can write an accurate critical analysis and appraisement of a book treating of a special subject. It requires knowledge and experience to make a judgment of the value of a given book and the book reviewer must in addition be able to give clearcut expression to his criticism. A great many medical books scarcely deserve space in the Books Received columns and should be ignored. Mischievous, misleading books should be mercilessly attacked. Strong useful books should be subjected to constructive, stimulating criticism.

One such able, honest, independent review a month will do a medical journal and its readers more good than a hundred halfbaked, stockform reviews which are equally valueless to author, reader and publisher.

TREATMENT OF ARTERIAL HYPERTENSION.

In these days of stress and strain and errors in diet, arterial hypertension may be said to be of comparatively frequent occurrence, and while its cure may be impossible, it may be kept in *statu quo* by judicious measures. It is of the greatest importance to ascertain the cause of the hypertension, and although differences of opinion exist on this point, there is sufficient agreement to make possible the preparation of a diet table from which have been excluded those articles of food shown to be harmful.

Dr. L. A. Amblard, of Vittel, a leading authority on arterial hypertension contributes to the French supplement of the *Lancet*, October 8, 1921, an interesting article on the subject. Dr. Amblard believes that all permanent hypertension is of renal origin and clinical evidence seems to support the contention, various disorders due to renal insufficiency being added by degrees to the hypertension, which at first was isolated. He points out, moreover, that when there is no albuminuria, no abnormality of diuretic rhythm, no disorder of renal function, it does not follow that the kidney is anatomically intact, this seeming anomaly possibly being due to inadequate means of estimating renal function.

Several other theories have been advanced. Huchard, however, upheld the connection between hypertension and renal sclerosis. He wished to attribute hypertension to a generalized spasm of the peripheral arterioles, a spasm developed under the influence of retention in the organism of vasoconstrictor poisons, resulting from insufficiency of urinary excretion. Amblard draws attention to the fact that if this process is the most probable, the origin of this spasm has not been attributed to the same cause by all writers on the subject. Besides, Huchard's theory has in its favor the results of experience, for in a general sense a fall in pressure follows a meatless diet in hyperpietic subjects.

If it is conceded then, as Huchard and Amblard declare, that arterial hypertension is due mainly to renal disorders or defects, it is somewhat remarkable that therapeutic progress in treatment has been so slow. The reason doubtless is that a large number of medical men do not hold with the view. Amblard believes that the end to be aimed at is the lowering of maximum pressure by the removal of its cause, that is, elevation of the minimum pressure. Huchard has shown that the latter is due to toxic disorders and, in consequence, the treatment of arterial hypertension resolves itself into the treatment of organic intoxication by decreasing the supply of toxin with an appropriate dietary régime, and by facilitating the removal of endogenous toxins by stimulating the normal functions of intestinal, renal, and cutaneous elimination. Other methods of treatment are indicated in addition to antitoxic measures. Treatment of the arterial walls should be attempted and direct efforts to reduce pressure may be cautiously initiated. Electric treatment with high frequency currents is an adjuvant not exerting any perceptible effect on hypertension, but useful in promoting sleep and diminishing nervous disorders associated with hypertension in irritable patients. "Nevertheless," says Huchard, "the fact must never be lost sight of that the condition begins, has its continuation, and ends through intoxication; therefore, a diet as little toxic as possible is indicated." Milk, cream, butter, fresh cheese, well ripened fruit, and vegetable soups form the basis of the dietary treatment. Too great stress cannot be laid upon the fact that only by continuous adherence to the alimentary régime can a marked and lasting lowering of pressure be obtained. Little salt must be permitted, less on account of the disputable hyperpietic action of sodium than on account of the knowledge of the nephritic origin of hypertension and the fear of more or less latent chloremia.

Amblard insists that in the majority of cases the omission of salt from the diet is followed by a diminution in the pressure, together with the disappearance of toxic troubles which accompany high pressure, notably dyspnea and headache. This French authority states with emphasis that, although a continued diet of milk or milk and vegetables may often be unacceptable to the patient, sometimes even impossible, there is at present no other means of maintaining lowered pressure. The advice is given that intestinal stasis should be combatted with frequent purgations and diuresis produced by theobromine. As for the relief of intestinal stasis, although it is essential to keep the bowels as clear as possible of toxic and fermenting material, the use of frequent purgatives is not recommended for this purpose by many who have had wide experience in treatment of this condition. Sir Arbuthnot Lane advises the employment of liquid paraffin and a diet which includes articles of food which aid peristalsis, such as graham bread.

The theory that arterial hypertension is of renal origin, resulting from organic intoxication brought about by gastrointestinal disorders and chiefly by intestinal stasis, is an attractive one and appears to be borne out by experience. A strong point in support of this view is that diet does affect the condition, meat increases hypertension because it promotes the growth of toxins, and a bland diet diminishes the pressure because it decreases the supply of toxins. It would seem to follow, therefore, as Amblard says, that the main agent for keeping down pressure is a suitable diet.

WORK.

Work is a frequent prescription for many ailments. Usually the remedy proves efficacious provided the patient has the right attitude. There are many attitudes toward work resulting in different qualities. We may cite the case of a man who suddenly became more interested in his work than he had ever been before. Early and late, scarcely leaving for his meals, he was hard at work. In time it was noticed that the work he was doing was not up to his usual high standard. Investigation disclosed that his labor was not prompted by a love for it but by a hatred for his wife. He was working in order to get away from her. Under these circumstances it is natural that he could not do his best.

There are two other attitudes which are of greatest import. Some look upon the product of their work as a reflection of themselves. They are only capable of seeing mirrored reflection of self as Narcissus saw himself reflected in the pool. The result of this attitude is a cramped outlook, a narrowed sphere. The attitude is a typically childish one. In many instances good work is done under these circumstances but this infantile attitude never allows for the best that one can do.

The last and most important attitude is the one where the worker looks upon his work as a product of himself, a child of his making. This is true sublimation. This is the adult attitude. Conditions being equal the work done under these circumstances is the best that one is capable of doing. Mediocre work has been done to be sure, but it represented the highest level the worker could reach.

When we prescribe work we should also interest ourselves in the quality of the work our patients will do. It is our duty to stimulate them as far as possible to approach their work from an adult point of view.

THE SYMPTOMATIC DYSPNEA OF CARDIAC DISEASE.

Gastric and respiratory disturbances are common complications of interstitial and parenchymatous nephritis. The respiratory disturbances may be dependent upon the kidneys or the heart, or both organs combined, in the production of the thoracic phenomena. The urea, being eliminated by the gastrointestinal mucosa, may become transformed into ammonium carbonate and excite the fibres of the pneumogastric nerve. This excitation, transmitted to the bulb, produces a spasmodic contraction of the pulmonary vessels and the finer ramifications of the bronchi by a reflex action. The area of hematosis, being thus diminished, becomes a cause of dyspnea and the spasm of the arterioles brings about an excess of pressure in the pulmonary artery. The heart, unprepared for this extra work, becomes insufficient, its right cavities distended, and it therefore seems fair to suppose that the respiratory disturbances precede the cardiac disturbances a considerable length of time. The gastric phenomena open the scene, but it is the cardiac insufficiency which, in the end, maintains the dyspnea.

The respiratory difficulty may manifest itself by simple oppression or true dyspnea occurring in paroxysms of suffocation. The prodromal symptoms of oppression are a feeling of weight, constriction or plenitude in the precardiac and epigastric regions. The usual nocturnal difficulty in breathing is occasionally so great that the patient remains sitting. Hematosis is consequently insufficient and the sense of fulness in the stomach occurring after meals increases this difficulty and accentuates the stifling, although it is rarely accompanied by gastric reflex coughing.

The dyspnea next takes the place of the respiratory difficulty and distress, occurring in paroxysms. The oppression and dyspnea have no bearing on the signs furnished by auscultation and percussion, because in reality, the resonance, except for a slight decrease, is normal. Expiration is somewhat prolonged and inspiration is easy. Sometimes the vesicular murmur is slightly diminished and at others a pronounced algidity is met with, undoubtedly due to contraction of the pulmonary vessels.

The asthmatic type of dyspnea may be mistaken for angina pectoris. It is to be remarked that the distressing retrosternal pain with radiations which characterizes angina pectoris does not exist in dyspnea due to dilatation of the right heart; the dyspneic paroxysms occur in the night, air enters the lungs with difficulty, but syncope rarely occurs.

The differential diagnosis between asthma and cardiac dyspnea is much more difficult, because in both conditions the paroxysms are nocturnal and are brought on by digestion, exertion and walking. The expectoration is the same in both cases, that is to say, it is small in amount, sticky and aerated, occasionally tinged with blood. In both conditions the respiratory distress results from an excitation of the pneumogastric nerve which produces constriction of the pulmonary capillaries and small bronchi by reflex action, hence the paroxysmal dypsnea. Paralysis of the vagus gives free play to the action of the sympathetic which manifests itself by its vasodilating function, hence glandular hypersecretion.

Parenchymatous nephritis produces dilatation of the right cavities of the heart, but this is the consequence of the preliminary dyspeptic and respiratory disturbances, as Potain long since has shown. The complete diagnosis of the affection may be difficult, as it is often hard to determine the true origin of the tricuspid insufficiency presented by the patient, as Budd, Rendu and Potain have pointed out.

Finally, since the writings of Potain, Traube and Israel, it is known that interstitial nephritis, by both mechanical and chemical action, produces hypertrophy of the left ventricle and this hypertrophy may provoke dyspnea of a more or less severe type whose mechanism is still not clear. It is unlikely that it is due to cardiac insufficiency, for the reason that although much fibrous tissue exists, there is undeniable hypertrophy of the cardiac muscle as well. It is quite possible that it may depend upon an obstacle to the circulation because the blood, being submitted to a high pressure, finds difficulty in circulation on account of the peripheral resistance.

COMPLICATIONS RESULTING FROM ANTITETANIC SEROTHERAPY.

Among the local complications resulting from the injection of antitetanic serum are those affecting the skin, muscles, joints and bones. There have been numerous reports of eruptions recorded. These erythemata may develop immediately or between the sixth day and a fortnight after the injection. According to Coldefy, the most frequent symptomatic associations are eruption with fever and arthralgia, eruption with angina and fever, eruption with diarrhea and fever, and eruption with arthralgia, albuminuria, and slight fever. The varieties of eruption are simple erythema, urticaria; aberrant marginate polymorphous erythema, scarlatiniform and morbiliform erythema, and hemorrhagic and purpuric erythema.

Myalgia is less common, usually occurring about a fortnight after the injection; Gampert, of Geneva, has recorded a case in which it occurred after an injection of only ten cubic centimetres of serum. Joint complications have been met with by le Dentu, Reynier, Chattot, Courmont, and others. These complications appear about a fortnight after the injection, involve several joints usually symmetrically and preferably the knee, the tibiotarsal joints, elbow, shoulder and wrists. In most instances the process in the joint is preceded or accompanied by erythema, muscular pain, digestive disturbances, albuminuria and fever, but suppuration and recurrence are unknown. Courmont noted in one case a febrile polyarthritis with trismus from arthritis of the jaw resembling tetanus, following a prophylactic injection of antitetanic serum.

The syndrome known as serum sickness was frequently met with in the early days of antitetanic serotherapy, but is now seen only when German sera are used, this probably being due to the manner of preparing the serum. It occurs from about a week to a fortnight after the injection, the onset beginning with a slightly reddened skin accompanied by a peculiar sensitiveness and tumefaction of the lymph nodes near the point of the injection. The fever is of the remittent type and morbiliform or scarlatiniform eruptions or urticaria may develop, while joint involvements and enlarged glands are important symptoms. A temporary renal congestion is likewise manifest in some cases. Headache, delirium, adynamia, restlessness, dyspnea, and a syncopal state are often present. These symptoms begin to decline in three to four days after their onset and recovery then takes place.

The most common phenomena observed following a second injection comprise both local and general complications, the former including various forms of localized edema. A point of nettle rash may appear, which differs from the urticaria following the first injection by its development within a few hours after the injection. Somewhat intense general complications may arise when the local edema assumes the aspect of a pseudophlegmon.

Arthus, of Lausanne, long ago noted that horse serum which is not toxic for normal rabbits becomes so if these animals have previously been given injections which have hypersensitized them. This observer also noted in rabbits which have been given a series of injections of horse serum in doses of five cubic centimetres a marked edematous infiltration of the spot of the last injection, followed by septic abscesses or gangrenous areas. A rabbit which has been given six or eight injections subcutaneously or intravenously may die in a few minutes when two cubic centimetres of serum are injected into a vein of the ear. Such an animal may at other times present acute phenomena of short duration, but in this case a progressive cachexia develops resulting in death in a few weeks. These local reactions and death from cachexia are known as the Arthus phenomenon. On the other hand, the phenomenon of Theobald Smith consists in the sensitization of the animals by a small dose of serum injected at one time.

Distinct relations exist between anaphylaxis and precipitins. The bacteriolytic properties of certain sera may, by the simultaneous destruction of a large number of bacilli, liberate a sufficient amount of endotoxins to cause accidents. The serum should be used with great prudence in tuberculous and renal subjects. It is desirable that antitetanic serum should be heated to 56° C. several times and hydrochloric acid may be added, according to Carnot and Slaveé's method. A large initial dose should be given and repeated at regular intervals during the development of tetanus. When the subject has had previous injections and is consequently probably in a state of anaphylaxis the first injection should preferably be by rectum. Calcium chloride in doses of fifteen to thirty grains a day may be given. Intravenous injections should be proscribed, as they may give rise to serious complications in sensitized subjects.

MOVIES AND HEALTH

An immense number of persons visit the moving pictures, and it is of importance to know in what respect this form of entertainment affects the health. In the first place, it is essential that the halls or theatres in which moving pictures are exhibited should conform to a high standard of hygiene. They should be airy and well ventilated, and the seats should not be in close proximity.

The most obvious medical consideration involved in moving picture houses is the effect on the eyes. A study has been made of the eyes of persons who, in the way of business, are required to look at films for many hours a day, and the fact appears to have been well established that the eyes of these persons suffer no more injury than of persons employed in any other manner.

With regard to children, it goes without saying that they call for special care; but the cheapest seats are the nearest to the screen, and it is in these seats that children are to be found. Again, from the psychological point of view, the child naturally affords a special problem, because of its susceptibility to impressions and the danger of terrifying, exciting, or otherwise working upon the emotions. However, this aspect of the question has also been overemphasized. No sensible or responsible person should take a child to a moving picture show without selecting an appropriate program and without observing its effects on the child, and especially its effects on the child's sleep afterwards.

In many respects the movies may exert a good influence on health, for instance, in the teaching of hygiene and other subjects relating to health and science. This use of moving pictures has been for some time recognized in this country, and the educational value of this mode of teaching is so thoroughly appreciated that schools and churches are making good use of this most influential of modern inventions. On the whole, while several reforms might advantageously be introduced in the interest of public health in the production of moving pictures and in the management of the houses in which they are brought out, considered from the point of view of hygiene, the moving picture theatre will compare favorably with most other forms of entertainment. They should, however, at all times be subjected to close inspection, and should be maintained in the highest sanitary and hygienic condition possible.

THE ETIOLOGY OF EXANTHEMATA.

Probably in no section of medical practice has there been a more radical change of views than in dermatology. It is well within the memory of the average practitioner that topical treatment was the mainstay of the dermatologist, and even the more modern works on skin diseases abound with formulas for ointments, plasters, pastes, mulls and lotions for the treatment of the various dermatoses. But within the past decade the important rôle which the skin plays as an emunctory organ is beginning to be more clearly recognized and incidentally the dermatologist is coming to realize that many of the dermatoses hitherto looked upon as local diseases are merely manifestations of faulty metabolism, and are the result of an effort on the part of the organism to throw off effete matter. Now comes Dr. Arthur Whitfield, physician in charge of the skin department, King's College Hospital, London, who tells us in the Lumelian Lectures, delivered before the Royal College of Physicians of London (*Lancet*, July 23, 1921) that one must look for the etiology of the dermatoses, not only in focal infection, in dental irritation, in tonsillar disease, or in faulty metabolism. He believed that mental strain was frequently the cause of skin diseases. Lumbar puncture, for instance, was almost a specific for lichen planus, showing some sort of relation between the disease and the central nervous system.

News Items.

Dr. Gibney Honored.—The fiftieth anniversary of Dr. Virgil P. Gibney as head of the Hospital for the Ruptured and Crippled was celebrated recently. On this occasion a loving cup was presented to Dr. Gibney by the trustees and staff of the institution.

Harvey Society Lecture.—Dr. Allen K. Krause, associate professor of medicine, Johns Hopkins University, will deliver the fifth Harvey Society Lecture at the New York Academy of Medicine, Saturday evening, January 21, 1922. His subject will be Experimental Studies on Tuberculous Infection.

The Red Cross Courier.—The American Red Cross Society will begin in the near future the publication of a weekly periodical called the *Red Cross Courier*, which will be the official organ of the organization. It will take the place of all bulletins now published at National and divisional headquarters.

Bequests to Charities.—By the terms of the will of Morris S. Barnet, who died on December 23d, Mount Sinai Hospital will receive $50,000; the United Hebrew Charities and the Montefiore Home will each receive $1,000, and the Beth Israel Hospital and the National Jewish Hospital for Consumptives in Denver will each receive $500.

New Building for Sydenham Postgraduate Hospital.—The Sydenham Postgraduate Hospital, in East 116th Street, has purchased a site on Manhattan Avenue and 124th Street for a ten story modern fireproof hospital building. When completed the land, building and equipment will represent an outlay of $1,000,000.

Death Rate Low in New York.—According to mortality statistics made public by Dr. William H. Guilfoy, registrar of the Department of Health, the general death rate in 1921 was 11.17 in a thousand of population, the lowest ever recorded in this city. In 1920 the rate was 12.93, which was considered phenomenally low.

French Academy of Medicine Considers Candidacy of Mme. Curie.—The election of Mme. Curie to the French Academy of Medicine was recently proposed by Dr. Beclerc and Dr. Quenu. While her candidacy has the backing of a large faction there has arisen considerable opposition as the election of a woman to the Academy is without precedent.

Bronx Hospital for Veterans.—Plans for remodeling the Bronx Hospital for the treatment of exservice men have been approved by the Treasury Department, and work will be rushed. It is hoped to have the hospital ready for occupancy by March 15th. There will be one thousand beds, and the remodeling will cost approximately $700,000. The hospital will be for the treatment of general cases.

Reconstruction Hospital to Be Enlarged.—At a meeting of the directors of the Reconstruction Hospital, 100th Street and Central Park West, plans were formulated to raise $1,500,000 to build a twelve story hospital to be devoted to the treatment of industrial diseases and accidents. The hospital now occupies a six and a half story building, which will be used exclusively for administrative purposes when the new building is completed.

The de Roaldes Prize.—Competition for the de Roaldes Prize of the American Laryngological Association is now open to nonmembers of the association. This prize is a gold medal valued at $150 for the best original thesis on a subject pertaining to laryngology or rhinology. Theses must be in the hands of the chairman of the prize committee, Dr. D. Bryson Delavan, 40 East Forty-first Street, prior to April 1st.

Endocrinological Society of New York.—This society was organized recently with the avowed object of furthering the interests of endocrinology and standardizing endocrine products. Its first scientific meeting was held on Friday evening, January 6th. The chairman, Dr. Jacob Gutman, of Brooklyn, opened the meeting with an address on Our Problems in Endocrinology. Dr. Charles E. de M. Sajous, of Philadelphia, spoke on The Present Status of Endocrinology from the Viewpoint of the Clinician. Dr. Harry Benjamin presented Observations in Retardation of Senility (Steinach Method).

Internationalizing Sera Standards.—Coöperation of the foremost laboratories of the world for the unification of international standards of antitoxic sera has been begun on a large scale by the League of Nations Health Committee, according to detailed plans received here. Already two preparatory conferences have been held, the work divided among the various national laboratories, and the individual studies have begun. The United States has agreed to cooperate in this work through the United States Public Health Service at Washington, and through the presence at the conferences of Dr. Rupert Blue, assistant surgeon general, stationed at Paris. German scientists will also take part, as well as Japanese and representatives of all the greater European medical services.

Typhus Spreading in Moscow.—The typhus fever epidemic in Moscow has already assumed serious proportions. The disease is being spread by refugees from the famine area and an epidemic of a dangerous character during the coming months is feared. Upward of eight hundred new cases were reported to the hospitals during the week ending December 17th. Shortage of doctors, nurses, medical supplies, and hospital equipment aggravates the evils of overcrowding, undernourishment, dirt and lack of washing and sanitation facilities. Every day the situation is growing worse, though every effort is being made by health authorities to check the spread of the disease. Dr. Reginald Farrar, representative of the Epidemics Commission of the League of Nations, died in Moscow on December 29th from typhus contracted in the famine area. Other cases have occurred among the relief workers, with several deaths.

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Died.

Baber.—In Dallas, Tex., on Monday, November 28th, Dr. William L. Baber, of Winnsboro, aged forty-nine years.

Baldwin.—In Ruthven, Ia., on Friday, December 16th, Dr. Gilbert Baldwin, aged sixty-two years.

Beane.—In East Liverpool, Ohio, on Saturday, December 10th, Dr. William A. Beane, aged forty-nine years.

Bentley.—In Baltimore, Md., on Monday, December 12th, Dr. James M. Bentley, of Cincinnati, Ohio, aged thirty-four years.

Bergold.—In Brooklyn, N. Y., on Tuesday, December 20th, Dr. Henry John Bergold, aged seventy-two years.

Bronner.—In Louisville, Ky., on Wednesday, December 7th, Dr. Herbert Bronner, aged forty-two years.

Cady.—In Birnamwood, Wis., on Thursday, December 20th, Dr. Herbert Bronner, aged forty-two years.

Campbell.—In Watertown, N. Y., on Tuesday, January 3rd, Dr. Edwin Campbell, aged sixty-five years.

Cattron.—In Pekin, Ill., on Friday, November 9th, Dr. William O. Cattron, aged sixty-nine years.

Cheyney.—In Philadelphia, Pa., on Sunday, December 25th, Dr. Ernest Waldren Cheyney, of Montgomery, Ala., aged thirty-one years.

Church.—In Bristol, R. I., on Thursday, December 22nd, Dr. Russell S. Church, aged forty-five years.

Constable.—In New York, on Sunday, December 18th, Dr. Herbert Lee Constable, aged fifty-five years.

Cross.—In Vera Cruz, Mexico, on Tuesday, December 27th, Dr. Howard B. Cross, of the Rockefeller Institute, aged thirty-two years.

Cruse.—In Wappingers Falls, N. Y., on Monday, January 2nd, Dr. Thomas K. Cruse, aged seventy-three years.

Davis.—In Philadelphia, Pa., on Wednesday, December 21st, Dr. Frederick H. Davis, of Darby, aged fifty-six years.

Evans.—In Brookfield, Mo., on Wednesday, December 21st, Dr. John S. Evans, aged fifty-six years.

Falls.—In Philadelphia, Pa., on Monday, December 26th, Dr. Samuel C. Falls, aged fifty-two years.

Folk.—In Columbia, S. C., on Monday, December 12th, Dr. Luther B. Folk, aged sixty-seven years.

Ford.—In Elmira, N. Y., on Sunday, December 25th, Dr. Henry Hale Ford, aged fifty-eight years.

Fulton.—In Mt. Pleasant, Pa., on Friday, December 30th, Dr. Ralph E. Fulton, aged seventy-eight years.

Gallagher.—In Slaterville Springs, N. Y., on Saturday, December 24th, Dr. William C. Gallagher, aged eighty-one years.

Goddard.—In Milwaukee, Wis., on Friday, December 2nd, Dr. Nathan A. Goddard, aged forty-six years.

Hill.—In Tacoma, Wash., on Tuesday, December 13th, Dr. Eugene W. Hill, aged fifty-seven years.

Hitt.—In Punta Gorda, Fla., on Saturday, December 17th, Dr. Albert E. Hitt, of Louisville, Ky., aged fifty-nine years.

Hinn.—In Fond du Lac, Wis., on Saturday, December 31st, Dr. Louis P. Hinn, aged sixty-four years.

Hoss.—In Muskogee, Okla., on Thursday, December 29th, Dr. Sessler Hoss, aged thirty-nine years.

Kennison.—In Boston, Mass., on Friday, December 23rd, Dr. William H. Kennison, of Madison, Me., aged fifty-two years.

Keyt.—In Berkeley, Cal., on Monday, December 19th, Dr. Marshall H. Keyt, aged sixty years.

Kimberlin.—In Hillsboro, Ind., on Wednesday, December 14th, Dr. Albert Carl Kimberlin, of Indianapolis, aged fifty-eight years.

Krueger.—In San Antonio, Tex., on Thursday, December 8th, Dr. Oscar Krueger, aged forty-one years.

Kuyk.—In Richmond, Va., on Friday, December 16th, Dr. Dirk A. Kuyk, aged fifty-nine years.

Langolf.—In Louisville, Ky., on Friday, December 16th, Dr. Frederick A. Langolf, aged forty-two years.

Linkman.—In Milwaukee, Wis., on Sunday, December 11th, Dr. Edwin George Linkman, aged thirty years.

Litchfield.—In Darby, Pa., on Thursday, December 15th, Dr. Henry N. Litchfield, aged fifty-one years.

Martin.—In Spokane, Wash., on Sunday, December 11th, Dr. Harry S. Martin, aged sixty-six years.

MacDonald.—In East Orange, N. J., on Saturday, January 7th, Dr. Joseph MacDonald, Jr., aged fifty one years.

McCoy.—In Pasadena, Cal., on Tuesday, December 20th, Dr. John McCoy, aged eighty-six years.

Mesick.—In Glenco Mills, N. Y., on Wednesday, December 14th, Dr. Nelson H. Mesick, aged seventy-six years.

Miller.—In Dayton, Wash., on Monday, December 12th, Dr. John M. Miller, aged sixty-three years.

Morrell.—In Benton Harbor, Mich., on Wednesday, December 21st, Dr. Charles B. Morrell, aged sixty two years.

Newman.—In Atlanta, Ga., on Wednesday, November 30th, Dr. Lewis C. Newman, aged fifty-three years.

Nicholson.—In Porterville, Cal., on Sunday, December 18th, Dr. Albert R. Nicholson, of Fresno, Cal., aged seventy years.

O'Connor.—In Philadelphia, Pa., on Friday, December 23rd, Dr. John H. O'Connor, aged sixty years.

Oliphant.—In Lafayette, La., on Sunday, December 25th, Dr. Samuel R. Oliphant, of Mount Vernon, N. Y., aged seventy-five years.

Olive.—In Waco, Tex., on Monday, December 5th, Dr. Nelson A. Olive, aged sixty-one years.

LONDON LETTER.

(*From our own correspondent.*)

London, *November 4, 1921.*

Annual Report of the Chief Medical Officer of the Board of Education—Discussion on Diabetes.

The annual report of the chief medical officer of the board of education, published recently, points out that the national system of inspection and treatment of school children, established in 1907, is beginning to bear good fruit. While the scheme has been successful so far as it goes, it covers only a part of the problem, and if it is to be really effective it must be extended to the years preceding and following school life. This need is now being provided for to a greater extent and the ideal of a coordinated supervision is being approached, aiming at a practical training of the body from infancy to adolescence. It is contended by some that the State cannot afford such a provision. As to this contention, Sir George Newman replies that in the interest of economy the State cannot afford to neglect such a provision.

This statement appears to be conclusively proved by the results of last year's medical inspection which showed that of 2,434,252 children examined no fewer than 1,166,794, or 47.9 per cent., were found to be suffering from some physical defect. The report, in outlining the scope of the organization, states that the medical staff of the 316 local educational authorities numbers approximately eight hundred fulltime medical officers and one thousand nine hundred school nurses. In addition, many officers are employed on part time in both groups. Approximately 2,400,000 children are medically inspected during the year, falling into three groups, namely, five years, eight years, and twelve years of age. Accordingly, every child attending the public elementary schools, whether sick or well, passes through the hands of a medical man three times in its school life. There are some nine hundred school clinics, used partly for examination purposes, but mainly for treatment. Treatment is also carried out by private practitioners and at hospitals. The experience of the educational authorities during the past fourteen years has demonstrated that there is a degree of physical defect and impairment among school children which prevents them from receiving reasonable benefit from the education provided, and is in itself wasteful in causing absence from school and disability. It is also demonstrated that unless authority itself arranges for or provides means of treatment the great majority of ailing children will not be treated and a harvest of physical degeneration will result.

The report goes on to say that wide and varied problems, medical and administrative, have arisen as the school medical service has yielded its findings. Year by year the young child coming into school and the elder child leaving school are in many cases debarred by poor health and physique from the healthy citizenship which may be considered to be their birthright, thus, quite apart from all questions of suffering, disease, or death, the State is not getting adequate returns for a substantial part of its public expenditure on education. The physical welfare and in part the education of the child of school age is dependent, in its origin, upon antischool conditions, healthy parentage, care during infancy, and a desirable home life. It is dependent, in its results, upon postschool conditions, aftercare, continued physical education, supervision of juvenile employment, and practical guidance in the duties of healthy and responsible parenthood. In other words, if we desire to rear a healthy and virile race of high capacity, we must, from a physical viewpoint, begin earlier and continue later than the formerly accepted period of education, and we must correlate our operations and agencies from the point of view of both economy and efficiency.

It is satisfactory to report that a scheme of supervision is being planned. The work of the sanitary authority and voluntary agency, combined with general social improvement, has brought about a decline of infant mortality which, since 1911, resulted in the saving of not less than twenty thousand infant lives a year. This is an example of State preservation. The successful medical treatment of four hundred thousand school children in a year is one of the results of the school medical service and is an example of State economy. Something more is required, however, namely, the equipment of the child for life, its cleanliness, its physical training, its education and its preparation for future employment.

Three disadvantages of State intervention were anticipated in the early days, namely, that such action would pauperize the parents and destroy the sense of parental responsibility, that it would impose a burden on the ratepayer, and would have a detrimental effect on the legitimate practice of medical men. The history of the school medical service has dispelled these fears. Parental responsibility has been stimulated and medical treatment has been sufficiently safeguarded to secure the support and cooperation of the medical profession. School medical service is not duplicating the work of the doctor but supplementing and enhancing it. Last year's inspection in London showed a marked improvement in the condition of children, the number of children found requiring treatment for defects showing a marked decline. A great improvement in the general state of the children's clothing, nutrition and cleanliness was also noted. The report also dealt with the effect on the health of the child of daylight saving in summertime. On the whole the report seemed to show that the action of the State in caring for and supervising the health of the rising generation had been amply justified by the results.

* * *

A meeting of the medical society of London was held on October 24, 1921, under the presidency of Mr. James Berry, F. R. C. S. The subject discussed was the modern treatment of diabetes, Sir Archibald Garrod, regius professor of medicine at Oxford University, opening the discussion. He said that it was an Englishman, Thomas Willis, who first detected sugar in the urine; Mathew Dobson, of Liverpool, first isolated it and initiated the study of acetonemia; Rollo, another Englishman, established the treatment of the disease by dieting; and the work of Pavy on the subject throughout his long life would never be forgotten. The ease with which sugar in the blood could be estimated had diverted attention from sugar in the urine. The effect of the administration of a dose of glucose had made possible a differentiation between the various diseases included under the term diabetes, and we were now aware that the prognosis was not so uniformly gloomy as once believed. During the war great advances were made in the treatment of the disease. Rollo's favorite diet for diabetes was protein and rancid fat. It was soon found that this could be improved upon, but all agreed that the main thing was to reduce the carbohydrates. Rollo kept his patient in the house and insisted upon a considerable amount of rest during the period of treatment.

The modern treatment of diabetes came to the notice of the British medical profession through the papers published in American medical journals about 1915 by Dr. F. M. Allen. Dr. George Graham in this country was arriving at the same conclusion by a different route, though both plans included hunger days. Allen fasted his patients with exceptions until the sugar disappeared. Graham prescribed shorter periods of fasting, the prolonged hunger of the Allen treatment did not appeal to him. The treatment was based on the idea of giving the damaged metabolic mechanism a chance of recovery. By complete rest to the damaged metabolic process a much greater restoration of tolerance could be insured than before. In the diet of diabetes it was not the carbohydrate alone that counted; fats and proteins were in their way deleterious to an important extent, and Allen had clearly shown that the diabetic was much better on a scanty diet, taking a diet of low caloric value all around.

Sir William Willcox said that in the severe forms of diabetes the condition of the pancreas must be borne in mind, and it was important to discover any toxic influence which might be exerting an adverse effect on that organ. As the pancreas was out of range of physical examination, it might be damaged without warning of that fact until time had been lost. Teeth, tonsils, and the conditions of the bowels should be inquired into. In some cases at St. Mary's Hospital, intestinal infections had been discovered, and Sir William thought that the prevention of diabetes in the future would rest largely on the detection of such toxic influences. To this end periodical examinations of the urine should be made a form of medical supervision which had not yet received the recognition it deserved in preventive medicine. With regard to dietetic treatment, during the past two years and a half, at St. Mary's Hospital, cases of diabetes which were under his care had been treated along Allen's lines, and almost without exception it had been possible to control the glycosuria. The only exception was one case in which the disease was associated with advanced tuberculosis. In very severe cases alcohol had been an advantage; it gave the patient the much needed 210 calories a day, but it should not be given on fasting days. The dietetic treatment was not curative when permanent damage to the pancreatic cells had taken place.

Dr. Otto Leyton spoke of the sensitiveness of the metabolism of the diabetic to any toxin. One could not expect to discover the optimum diet of a diabetic while there was a focus from which the poison was being disseminated. For purposes of treatment diabetes could be divided into three classes: 1. Those patients who had developed the disease comparatively recently, who were over forty years of age, and who probably were born with an undersized pancreas and an oversized appetite. The influence of overfeeding was seen in Allen's animal experiments. 2. Those in whom the disease had developed acutely and in whom the history was that of a fever of infective origin. 3. Those in whom the pancreas had deteriorated so much that it was impossible to find a diet possessing sufficient energy to maintain life and keep the blood normal. The restricted dietetic treatment of diabetes mellitus seemed to fail in active pulmonary tuberculosis. In some cases there was not enough pancreas left to support life. For these efforts should be made to find a diet to make the patient comfortable; it should not be expected that the blood could be made sugar normal.

Dr. W. Langdon Brown pointed out that the carbohydrate tolerance varied with the total basal metabolism. There was a tendency to attribute too large a share to the pancreas in the diabetic process; even Allen had said that a man might die a diabetic and yet have a good normal pancreas. The speaker thought that the sympathetic nervous system was the mechanism through which the glycosuria was produced, though, of course, he did not go so far as to say that the disease was purely nervous in origin. He demonstrated the valuable guidance afforded by an investigation of the blood sugar curve.

Dr. Edmund Spriggs pointed out that the real difficulty in the treatment of diabetes was not found in hospital patients while they were in hospital; it consisted rather in teaching the patient to control the diet at home. He outlined the knowledge which ought to be imparted to the patient and urged that he should be taught diabetic cookery.

Dr. E. P. Coulton also spoke on the dietetic aspect of the question confirming Dr. Spriggs's point of view. In threatening coma he had produced great relief by opening a vein and injecting a large quantity of five per cent. sodium bicarbonate. Dr. George Graham agreed with Dr. Spriggs that patients should be taught how to regulate their diet. Undernutrition was the essential treatment of the condition in America and in St. Bartholomew's Hospital.

Dr. P. J. Cammidge discussed his records of 143 cases, with fifty-two deaths, a mortality of thirty-six per cent. In some the treatment had produced such rapidly increasing acidosis that it had to be abandoned. He did not think that the fasting treatment could be regarded as a panacea to be applied to all diabetics; it was really an empirical experiment, as it was founded on experiments upon dogs. Dr. F. J. Poynton spoke of six cases in children under eight years of age, who had from three per cent. to five per cent. of sugar, with some acetone. The urine was freed from sugar, and the diet was then cautiously increased. For children of the poor a diet must be arranged which the parents could afford. Probably the modern treatment prolonged the lives of diabetics but in the matter of ultimate cure the profession seemed little further forward. The main point gathered from the symposium appeared to be that, while starvation and low diet prolonged the life of diabetics, it was not a cure for diabetes.

Book Reviews

CARDIAC EXAMINATION.

Les Nouvelles methodes d'examen du cœur en clinique. Par R. LUTEMBACHER. Avec One Hundred and Thirty-eight figures originales. Paris: Masson et Cie, 1921. Pp. vii-186.

This small volume emphasizes radiological cardiac examinations. Graphic methods are also given in some detail. The x ray plates are excellent. In many quarters x ray examination is proving a favorite method of diagnosis in functional disorders of the heart. For workers who rely on radioscopic findings this book should prove of aid. The balance of the work, while presenting little that is not known to cardiologists in America, sets forth the material in a comprehensive and condensed fashion. The book making and plates are unusually good.

CARDIAC DIAGNOSIS.

Diagnostic cardiologique. Par le Dr. SCHRUMPF-PIERRON, Paris, Agrégé de la Faculté de Médecine de Geneve. Avec Three Hundred and Thirty-two figures dans le texte. Preface de M. le Professeur H. VAQUEZ, membre de l'Academie de Médecine. Paris: Librairie J. B. Baillière et fils, 1921. Pp. 308.

Schrumpf presents a worthy book on cardiac diagnosis. Illustrations abound and are clarified by a text which reads delightfully. Many ingenious devices and tests are given, some of German origin and others developed during the war. These will prove new and of interest to the American clinician and cardiologist. A goodly portion of the book represents original work of a research nature done by the author, who, by the way, is an Alsatian. He has always endeavored to fashion his work so that it would have a practical application. He stresses the older clinical methods, as does Lewis, the British cardiologist, stating that all the mechanical diagnostic refinements are of no avail unless used in conjunction with the acumen gained by the crude clinical physical methods of diagnosis. The vasomotor nervous mechanism also receives due consideration, as the author realizes the importance of this system in cardiological practice.

CARDIAC BLOOD SUPPLY.

The Blood Supply to the Heart. Its Anatomical and Clinical Aspects. By LOUIS GROSS, M. D., C. M., Douglas Fellow in Pathology, McGill University, and Research Associate, Royal Victoria Hospital, Montreal. With an Introduction by HORST OERTEL, Strathcona Professor of Pathology, McGill University, Montreal. With Twenty-nine Full Page Plates, and Six Text Illustrations. New York: Paul B. Hoeber, 1921. Pp. xvi-171.

In the introduction to this book Horst Oertel gives a résumé of the purposes which it amply fulfills. They are: First, a complete description of the arterial and venous blood supply to the normal heart with a statistical study of its variations; second, the blood supply to the neuromuscular system of His and its pathological and clinical significance; third, a new viewpoint in the discussion of the anatomical factors concerning the etiology and development of valvular endocarditis, and, fourth, a newer view on the physiological course and character of the cardiac circulation in the various age periods and their relation to physiological and pathological functions.

The book contains contributions to the study of cardiology of first value. The work is mainly original and shows great skillfulness in handling. The plates are really beautiful, and aside from their artistic merit they are of value, as is also the text in the study of the physiology, both laboratory and clinical, and the pathology of the heart.

SURGICAL CLINICS.

The Surgical Clinics of North America. Volume I. No. V. (The Mayo Clinic Number). With One Hundred and Sixty-three Illustrations. Philadelphia and London: W. B. Saunders Company, 1921. Pp. 296.

One would expect that the Mayo Clinic Number of these popular monographs would maintain the high standard already set by numerous predecessors, and in this expectation the reader will not be disappointed. The current volume represents the best in present day surgical teaching; it is profusely illustrated, many of the drawings being from the pen of the ever industrious Miss Eleanor Fry, whose work has contributed in no small measure towards the popularity of the Mayo publications. There are twenty-nine articles, totaling 296 pages, by twenty-three contributors, all of whom are connected with the Mayo Clinic. The subjects cover a wide field, are described in detail, and presented in a most interesting and instructive manner.

PSYCHOLOGY OF THE UNCONSCIOUS

Collected Papers on the Psychology of Phantasy. By Dr. CONSTANCE E. LONG, Late Senior Assistant, Elizabeth Garrett Anderson Hospital; Late Medical Officer, Education Board; Ex-President, Association of Registered Medical Women. New York: Moffat, Yard & Co., 1921. Pp. xii-216.

Here is a practical book on the psychology of the unconscious which reveals in a simple yet very convincing way how the principles of such psychology are applicable to everyday problems connected with child training, education, social problems of various sorts, and most obviously with those medical problems of mental readjustment which belong to the author's particular province. She has drawn from her own experience for illustrations of the conflicts which arise, the importance of the unconscious in their formation, and of its investigation through the dream and otherwise in the discovery and release of these conflicts. She has much to say of the possibilities of a knowledge of the unconscious in training the personality to higher and more satisfactory outlets. This had led her into a discussion of the differences in the methods of Jung and Freud in treating the subject of the psychology of the unconscious. She is an acknowledged follower of Jung, but takes pains throughout her book to accredit Freud with the basic discovery of the psychology of the unconscious as a practical means of reaching these medical and other problems. She acknowledges his development of such a psychology along certain lines, the usefulness of which cannot be gainsaid by any other school. Her writing presents an interesting comparison of the two methods of thought by one who can maintain a relatively judicious attitude toward both sides. Her presentation, however, strengthens a conviction that Freud remains both clearer and more practical because he reaches the simpler fundamentals and is not afraid to see these reflected at higher levels.

TECHNIC OF PSYCHOANALYSIS

The Technic of Psychoanalysis. Nervous and Mental Disease Monograph Series, No. 26. By Smith Ely Jelliffe, M. D., Ph. D. Second Revised and Enlarged Edition. New York and Washington: Nervous and Mental Disease Publishing Company, 1920. Pp. xi-171.

Psychoanalysis has had its many years of trials and tribulations, of criticisms and attacks. Staggering under the blows of its enemies it has slowly but steadily moved forward to a place in the sun, until today it is pretty generally conceded that the psychoanalytical school has brought much of value to the understanding of human behavior.

Not a little of the criticism that has been addressed against it has been due to a complete misunderstanding of its methods, the way in which it arrived at its facts, and the reasons for the conclusions it drew from them. It was not appreciated, in short, how psychoanalysis obtained its facts. In this book of Dr. Jelliffe's, now in its second edition, there is the first attempt in English to discuss and to formulate the method of analysis, and as such an attempt and also because it shows where the facts of psychoanalysis come from and how they are obtained, it deserves a careful and thoughtful reading, while further, as a work on the technic of analysis, it can hardly be left out of consideration by anyone who attempts to qualify in this branch of therapeutics. The general plan of this work must commend itself to all who are interested in psychoanalysis. In the first chapter, for example, the author discusses the material to be analyzed, particularly does he undertake to differentiate those patients upon whom an analysis should not be attempted. This is an exceedingly important contribution to the subject and one about which much of the criticism of psychoanalysis has heretofore unwittingly revolved. Following this there is a chapter on the literature of psychoanalysis which should be of inestimable value to the beginner, a condensed catalogue of sources, so to speak. From here on the author plunges into his subject, starting in with the opening of the analysis, going on to a discussion of the Œdipus hypothesis as a psychological measuring unit, and spending two chapters upon a discussion of the transference and its dynamics, the real lever of psychoanalysis. The final chapter takes up, among other things, the use of the dream material. The case material is drawn from the author's own experiences and in several instances is carefully illustrated by diagrams to show the author's concept of how the psychic energy is included and expressed in symbols at the various functional levels. This method of explaining the material by diagrams should be very useful to those who find it difficult to think in terms of the unconscious.

The book as a whole is not only a valuable contribution to psychoanalysis. It is much more valuable than its 168 pages would indicate. The author is a facile thinker, who does not rest content with static concepts, but works unremittingly with fluid material, working over and over again the formulations and with keen insight suggesting all sorts of new possibilities, new directions for further work. It is the way in which the material is handled from this point of view that stamps the work essentially original. The book gives a broad understanding of the subject of psychoanalysis, its meaning as applied to the problem of psychotherapy, and in its wider reaches from the viewpoint of the exposition of its technic. It is to be highly commended to all who are interested in this new movement in psychology, and who nowadays can afford not to be?

DR. SMITH ELY JELLIFFE

PSYCHOPATHOLOGY.

Twelve Essays on Sex and Psychoanalysis. By Wilhelm Stekel, M.D., Vienna. Translated and Edited by S. A. Tannenbaum, M. D., New York. New York: The Critic and Guide Company, 1922. Pp. 320.

These essays are of value to the worker in psychopathology. There are times when Stekel's ego, seen in many of his writings, tends to cause annoyance, but even this may be excused as coming from his enthusiasm. Even though the reader may not agree with every point he brings up, yet enough is left which is pertinent to make the reading worth while. Throughout the essays continual credit is given Freud for his original findings. This contrasts with the work of many psychopathologists—those who agree and pretend to original rediscovery of Freud's principles and others who pretend to disagree for the sake of stressing originality of points of remote import. At times Stekel tends to be florid, but he is always readable and instructive. His observations on kleptomania, exhibitionism, concealed piety, homosexuality, obsessions, phobias, continence, and impotence are valuable and the psychiatrist will recognize many symptoms he has previously encountered and will be able to trace the workings of many mechanisms which hitherto have been obscure.

MAYO CLINIC ACTIVITIES.

Collected Papers of The Mayo Clinic, Rochester, Minnesota. Edited by Mrs. M. H. Mellish. Volume XII, 1920. With 446 Illustrations. Philadelphia and London: W. B. Saunders Company, 1921. Pp. 1392.

The current volume of the Mayo papers, published in various journals during 1920, contains so much material of intrinsic value to the medical practitioner that the reviewer finds it difficult to comment on it adequately. Sixty members of the Mayo staff have contributed 131 papers to this volume, the subjects covering well nigh every branch of medical science. The present volume is truly cyclopedic in character, and enjoys the advantage of being fresh and up to the minute, as it were.

The alimentary tract, as usual, receives the greatest amount of attention, twenty-one articles being devoted to this subject. The urogenital organs are dealt with in thirteen articles, all of practical value; the radium treatment of the female genital organs occupies a prominent place in this section. The surgery of the ductless glands and the section on skin diseases and syphilis are likewise fully considered in typical Mayo fashion. One is tempted to say that no physician ought to undertake the treatment of syphilis without having previously read and thoroughly mastered Stokes's article on the Arsphenamines in Therapeutics.

The internist will find the sections on the blood and the heart of considerable interest, particularly the articles by Willius: Henderson's articles on dislocations and on tuberculosis of the knee joint in children, will more than repay the time spent on reading them; and those who are fond of travel in Latin America will be fascinated by W. J. Mayo's Observations on South America.

The illustrations maintain the usual high standard of previous volumes, the paper and press work are of the best, and there is a complete index of subjects and a bibliographic index of authors which covers nearly eleven solid pages. The volume is one that can be recommended as being thoroughly representative of the activities of the Mayo Clinic.

SURGICAL PROGRESS IN ITALY.

Modern Italian Surgery and Old Universities of Italy. By Paolo de Vecchi, M. D., Corresponding Member of the Royal Academy of Medicine, Turin; Fellow American College of Surgeons. Foreword by George D. Stewart, M. D., President of the New York Academy of Medicine. With Fifteen Full Page Illustrations. New York: Paul B. Hoeber, 1921. Pp. xvii-249.

The author's purpose in the preparation of this interesting work is to familiarize Americans with "the great progress made in Italy in every branch of the scientific field, especially in surgery, during the last fifty years." He hopes thereby to encourage us to visit Italy not only as a pleasure resort but as a new country and a new seat of education. Incidental to the discussion of Italy's surgeons and their work, the author pays particular attention to the Italian universities with which the schools of surgery are connected. All of this makes interesting reading, though its value as a scientific contribution is extremely doubtful.

There are interesting chapters on the American Red Cross in Italy, on war surgery and reconstruction institutions, and a critical reply to Sir Rickman Godlee's charge that Italian surgeons were among the last to adopt Lister's teachings. Throughout the work are references to the work and teachings of Italy's famous surgeons, among whom may be mentioned the names of Bassini, Porro, Bottini, Rizzoli, Codivilla, Durante, Bastianelli, Giordano and Ceci. In fact, it would seem to a superficial reader that all the most important advances in modern surgery originated in Italy, but this impression must be ascribed to the enthusiasm and patriotism of the author for his native land and its scientists. The foreword by Professor Stewart is an expression of his personal friendship and respect for the author and for his countrymen who have contributed to surgical progress.

The author is to be congratulated on the splendid output of his pen; it certainly will serve to bring about a better understanding between the surgeons of America and Italy, and thus help to hasten the day of international amity and brotherhood for which all of us are hoping and striving.

GLANDS AND PERSONALITY.

The Glands Regulating Personality. A Study of the Glands of Internal Secretion in Relation to the Types of Human Nature. By Louis Berman, M. D., Associate in Biological Chemistry, Columbia University; Physician to the Special Health Clinic, Lenox Hill Hospital. New York: The Macmillan Company, 1921. Pp. 300.

This is the most interesting and enlightening book on endocrinology that the reviewer has ever read. It reads like a novel, and holds the attention from start to finish. The author presents not only his first hand knowledge of the subject, but also his conclusions from a complete and discriminating study of the vast literature. Most practitioners are too busy to study clinical endocrinology, and many physiologists, who can determine only the evident demonstrable effects of total extirpation of glands, i. e., operated animals, will not accept the clinical facts that there are all grades of oversecretion and undersecretion of these glands, which not only cause symptoms but, as the author so well describes, modify character and cause all kinds of normal and abnormal impulses.

One need not accept every conclusion at which the author arrives, but this book represents a basic platform of generally accepted facts, of partially accepted probabilities, and of unproved possibilities from which can be built up by laboratorial, pathological and clinical investigations one of the most important biological and chemical sciences of the age.

Life seems to be made up of chemical and electrical reactions. The vitamines are probably necessary for the activation or for the chemical composition of the hormones manufactured by the endocrine glands, hence their vital importance. Doubtless the character of the food, the climate, the environment, the infections suffered and the type of glands inherited, all, as the author urges, modify and determine the amount and efficiency of the hormones produced by the endocrine glands. Every practising physician should, unprejudiced, study all that is known of the endocrine glands, and of the effects of chronic, as well as acute, focal infection (as chronic focal infection always injures one or more glands by toxins) and then use the knowledge thus acquired in the treatment and management of his patients.

It is not necessary to discuss the book in detail. It is sufficient to recommend that this book be carefully read and the reader will be the better equipped to understand and treat his patients.

LABORATORY TECHNIC IN BLOOD CHEMISTRY.

Mikromethodik. Quantitative Bestimmung der Harn- und Blutbestandteile in kleinen Mengen für klinische und experimentelle Zwecke. Von Dr. med. et phil, Ludwig Pincussen, wissenschaftlichem Assistenten der II. Medizinischen Universitatsklinik zu Berlin. Mit 19 Abbildungen. Leipzic: Georg Thieme, Verlag, 1921. Pp. 116.

This little volume is packed full of laboratory technic as applied to the microscopic study of the urine and blood, in small quantities. The author lays emphasis on the value of these technical methods in their application to the subject of experimental pathology. He calls attention to the fact that a few drops of blood suffice today for all practical purposes, whereas formerly at least one hundred c. c. were required for examination. The laboratory worker will find this little work of considerable interest in his microscopic studies, particularly in the matter of blood chemistry, to which a large portion of the booklet is devoted.

MATERIA MEDICA FOR NURSES.

Textbook of Materia Medica for Nurses. Compiled by Lavinia L. Dock, Graduate of Bellevue Training School for Nurses. Seventh Edition, Revised. Revised in Accordance with the Ninth Decennial Revision of the U. S. Pharmacopœia. New York and London: G. P. Putnam's Sons, 1921. Pp. xii-315.

This is an excellent little book which has demonstrated its value in the past by attaining its present seventh edition, which has been brought up to date so as to conform with the Ninth Decennial Revision of the U. S. Pharmacopœia. A few errors appear to have crept in, which seem out of place in so good a work as this: "Neosalvarsan is similar in action (to salvarsan) and is given in the same dose, with equal precautions." Argyrol is not mentioned either in the text or in the index, though protargol is given five lines. We are sure an eighth edition will shortly be required. It is an excellent book for nurses.

THE PSYCHOLOGY OF BEES.

A Book About the Bee. By Herbert Mace. With Twenty-four Illustrations on Art Paper, from Photographs by the Author. New York: E. P. Dutton & Company, 1921. Pp. x-138.

A charming brochure which should find interest not only among those interested in bee raising but among scientists, for it offers many interesting suggestions regarding the psychology of insect life. The construction of the hive built up around the female and that of the herd also presents many problems of interest to the student of social development. Many habits of the bee generally unknown and not even discussed by careful workers like Fabre or Maeterlinck are brought out by Mace. The subject has a simple yet fascinating style.

CHARACTER STUDIES.

Mr. Waddington of Wyck. By May Sinclair. New York: The Macmillan Company, 1921. Pp. 315.

There are two angles of vision brought to focus with exceptional clearness upon Mr. Waddington. First, the eye of the writer, a keen student of psychology, who knows full well the Freudian diagnoses and manifestations that form the skeleton of the amiable narcissist whom she pads comfortably against the digs of a world that has found him out. Then, as a merciful relief from Miss Sinclair's too clear knowledge of him, she projects the home circle about him, studying him, delighting in him at every unforeseen, inevitable happening that proves him true to type.

Mr. Waddington is serious minded, ponderously so. He is the only serious person in the world. Ergo, he is the only considerable person in the world. And the inconsiderable others enjoy his satisfaction with his state of mind to such an extent that they cannot bear to disillusion him. He is allowed to live a phantasy life without interruption, except at the moments of awkward tangential skidding of fantasy and reality. Then he is brought up short. But his Waddington of Wyckness inspires him with ready complacency. Moreover, he always has his mother to fall back upon, to whom he will never be more than thirteen years old and always the centre of the universe.

KOREAN LEGEND.

Winning Buddha's Smile. A Korean Legend. Adapted and Translated by Charles M. Taylor. Boston: Richard G. Badger, 1921. Pp. 153.

A charming Korean legend interspersed with bits of phantasy and dreams. The dreams are usually those of an explanatory nature involving the appearance of a departed ancestor. In one instance, an anterpretation is offered and in order to present unity, the dream is made to carry two, not irreconcilable interpretations—an overdetermination of the symbol. In parts the legend closely resembles the *Yellow Jacket,* a play very popular in this country several years ago, which was carefully analyzed by Kempf and independently by Jelliffe. This is one of the few Korean legends in English. It has a remote origin which goes back several centuries but the exact date and the author are unknown.

THE PLOT THICKENS.

White Shoulders. By George Kibbe Turner. New York: Alfred A. Knopf, 1921. Pp. 283.

This book is a socalled romance of the South, where the Old School of thought is assumed to predominate. The lay figures of family honor, the marriageable daughter, the redemption of the wealthy youth who has hitherto found all life's experience paltry, are padded and tinselled and promenaded before us. The author occasionally lapses into satire on the archaic institutions shown in his story, but we do not see that he is eager to replace them by something constructive. The action takes place in the petty circle of a refined southern boarding house, an incongruity in itself. Blackmail, murder, and attempted suicide are poured into the porridge lavishly, but the plot never thickens to the point of whetting our appetites with the sauce of successful mystery.

Practical Therapeutics

RECENT CHANGES IN THE TREATMENT OF THE CHRONIC CARDIAC PATIENT.*

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During the past ten years there has been a definite improvement in the treatment of patients with cardiac insufficiency. Yet it is not a revolutionary process, for we find ourselves still using chiefly rest, exercise and digitalis, the same therapeutic media that have been used for years. The difference, it seems to me, lies in the fact that we are now using these media more exactly and carefully because we know more about the reasons for the circulatory insufficiency in each given patient, and we know more about the action of each of the therapeutic measures, and we know better how to use them to obtain the desired action. Our diagnosis is more thorough; our understanding of what may be expected from each of the therapeutic measures is more exact, as is also our knowledge of how to use them. The empirical method has been supplanted by methods which are the result of a clear understanding of the conditions.

One new idea that has made its appearance is the importance of infectious processes, not so much as a cause of valvular disease, for this has long been recognized, but as a cause of the repeated attacks of cardiac failure that are such a distressing and harmful feature of the progress of many patients. These socalled breaks in compensation are less often due to cardiac overstrain than to an exacerbation of the infection.

It seems to be a rare thing for the first infection which involves the heart so seriously to cripple it that the patient will gradually decline till death occurs from cardiac failure. The first infection may cause valvular disease and a certain amount of myocardial damage. The patient may be sick in bed during this invasion, and may show a high temperature due to the infection, a rapid or irregular heart action caused by cardiac involvement, perhaps precordial pain, and, perhaps, evidences of some degree of circulatory failure as shown by dyspnea on ordinary exertion, or râles at the bases of the lungs, or distention of the veins of the neck, or more rarely by orthopnea and edema. After a time the acuteness of the infection subsides and the heart regains its strength so that it is again able to carry on the circulation properly, and, although the patient may now show physical signs of valvular disease, he will usually have a cardiac reserve which enables him to perform a normal or nearly normal amount of exercise without evidence of cardiac overstrain.

There are many other patients who arrive at this same condition of having a damaged valve, and probably also a somewhat damaged heart muscle, by a more gradual process and without a period of bed sickness. The quantity or quality of the infection in these cases never reached a sufficient degree to cause either evident rise in temperature or evident signs of cardiac invasion. These patients are accidentally discovered by life insurance examiners or other routine examinations to have valvular disease, and yet, often have never had any symptoms referable to the heart.

CAUSES OF BREAKS IN COMPENSATION.

It is important that in such a patient as either of those mentioned a severe cardiac failure should not be allowed to develop, for this of itself, we believe, may lead to a structural degeneration which is permanent. According to the older teaching, this prevention of failure was to be accomplished by preventing overexertion with consequent heart strain, but the present idea places more emphasis on reinfection of the heart.

It is perfectly true that if a patient with a diseased heart is repeatedly and frequently exercised to a degree that will cause dyspnea and palpitation to appear, then that patient will gradually be able to do less and less and will eventually find it necessary to go to bed on account of severe heart failure with orthopnea and edema, unless the cardiac overwork shall have been stopped before this state is reached. It is also true that a single period of overstrain in manual labor or childbirth or a long operation may lead to a condition of severe heart failure which will result in the inception of auricular fibrillation in an auricle already diseased, and that this abnormal rhythm may persist after the severe heart failure has been relieved by proper measures.

It may be that a patient who has been obliged to go to bed by long continued overexertion can be restored by proper treatment to as good a physical state as before this severe heart failure, but we are inclined to doubt this. Certainly, if the failure results in a permanent auricular fibrillation there will remain a permanent handicap. Overexertion, then, whether acute or long continued, can lead to a serious and perhaps permanent harm to the patient, and, therefore, we must not allow the patient to overexert. The details of this phase of the treatment will be more fully considered under the heading of rest and exercise. We must remember, too, that a mental strain as well as a physical one has an effect on the heart, no matter whether it is severe and of short duration or less severe and of longer duration. This feature also is discussed more fully later.

The new idea which has been added to the old idea of the production of severe cardiac failure in patients who already have valvular disease, is that the failure is due to a reinvasion of the heart by a bacterial or other toxic process. A heart muscle which has previously been capable of answering all or most of the demands of the circulation is reduced by a toxic degeneration, with or without bacterial invasion, to such a subnormal functional condition that the circulation fails to a more or less marked degree. Sometimes the increased degree of failure may be but slight when the invasion is mild, so that a patient who was able to ascend three flights of stairs with ease, and to run, is now held up by dyspnea after climbing two flights, and yet is able to walk freely on the level as long as he does not hurry. Sometimes the failure will be more severe, so that the patient must remain in bed.

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*Read before the Greater New York Medical Association, March 21, 1921.

In a very large proportion of patients complaining of a more or less sudden decrease in their cardiac ability this decrease is due to a reinfection of the heart. This is especially true of the class of patients who do not depend upon manual labor for their living, for the laborer—and this includes the woman who does housework and bears children—is more likely to break down because of continued or sudden overwork of the heart.

PREVENTION OF REINFECTION OF THE HEART.

You may have thought that what I have been saying has little to do with treatment, but this is far from true. I have gone into this detail only to emphasize the fact that the first step in the treatment of a cardiac patient who is not suffering from severe cardiac failure is to see to it that all the known paths by which infection can enter the body are blocked. The danger may come through infected tonsils, dental root abscesses, pyorrhea, chronic infection of the nasal sinuses or ear, of the prostate or the endometrium, or the appendix, and last but not least through the large intestine as a result of fecal stasis. All of these regions of the body should be examined and made as nearly normal as possible by treatment.

A great problem is found in the tonsils. Removal of the tonsils seems to be indicated in almost every patient with valvular disease that we consider to have a socalled rheumatic origin. If we take as a criterion for removal that a tonsil from which foul smelling, cheesy material can be expressed is a dangerous one, then many tonsils will be found guilty. If we consider that the tonsil should be removed when there is an enlargement of the submaxillary node into which the tonsillar lymphatics drain, the node lying just behind and below the angle of the jaw, then there will be a smaller number considered dangerous, while if we demand both the foul smelling crypt material and lymph gland enlargement, the number will be further reduced. Cultures of the crypt material cannot be used as a guide, for apparently dangerous organisms are demonstrable in almost every tonsil.

I think that almost every one agrees that a history of recurrent attacks of tonsillitis is an imperative indication for tonsillectomy, but beyond this there is not an agreement at present. It is my personal opinion that any patient with heart disease who has more than one sore throat during each winter, including pharyngitis with tonsillitis under this heading, or who has definite enlargement of the lymph gland at the angle of the jaw, or who has foul smelling, cheesy material in the tonsillar crypts, should have the tonsils removed. I also believe that tonsillectomy should be done when a patient with heart disease or definite rheumatic manifestations shows the two local conditions in the tonsil even without a history of socalled sore throats. It may be that occasional needless operations will be done, but the danger of the operation is almost negligible and the danger of recurrent infection of the heart is great. Of course, it is admitted that there are occasional unfortunate occurrences after tonsillectomy, such as hemorrhage, infection of the stump, and rarely septicemia, but if care is taken not to operate too soon after an active infection of the tonsil, the danger is reduced to a point where it is not much of a deterrent. We must balance each patient's tendency or liability to reinfection against the likelihood of danger from the operation.

Root abscesses, pyorrhea and chronic sinus and ear infections are probably not a common cause of rheumatic infection, of heart disease, or of cardiac reinfection, though in certain cases one of these conditions will be the cause. The same statement applies to the other possible portals of entry that have been mentioned. It is a good method of procedure first to investigate the tonsils and to have them out if it seems advisable. If enlarged lymph nodes of the neck subside after operation to normal size, we may feel that we have probably removed the source of their infection. If the lymph nodes remain enlarged, we should then carefully examine the gums, teeth, nasal sinuses and ears, and have any defects corrected. Remember to be properly sceptical of the x ray diagnosis of root abscesses. If there is not a typical shadow, it is better to retake the picture than to remove teeth unnecessarily.

Constipation must be corrected, and it is wise to have the prostatic secretion examined for pus, or the discharge of the vaginal cervix examined if no other definite findings have been met with. These are uncommon sources of infection, but in some cases they are the source, so they must not be forgotten.

There is little to say about syphilis as the cause of heart disease, but that little is very definite. It is a common cause of heart disease in people over thirty-five years of age. It usually affects, not only the aortic valve, but also the muscle. If active it will give rise to a positive or doubtful Wassermann reaction, and whenever activity is thus shown, the patient should be energetically treated by salvarsan and mercury.

REST AND EXERCISE.

We can now come to the question of rest and exercise. There was a time when almost any patient with a cardiac murmur or an irregularity, who complained of any symptoms referable to the heart, such as even a slight dyspnea on exertion, or palpitation, or pain, was likely to be advised to rest in bed for a number of weeks. Even now I see occasional patients who have received this advice. Rest in bed is thus advised indiscriminately because of a failure to comprehend the true reason for rest, or the objects which may be attained by rest.

As has been mentioned previously, I believe that if a patient exercises frequently to a degree that causes prolonged rapid heart action and objective dyspnea, this patient is doing harm to his heart. Objective dyspnea is an indication that the ventricles have been called upon for an increase in the blood flow through the lungs, which they have been unable to meet, so that the blood has become under-oxygenated. The harm arises, however, because the rapid rate allows too short a diastole in which the ventricles may recuperate from the previous contraction.

If, then, we find that the slight exertions of moving about the house are sufficient to bring on prolonged rapid heart action and objective dyspnea, then we should recommend that this patient should rest in bed until, under treatment, his cardiac ability has improved so that this small amount of exertion does not cause these abnormalities in the physiology of the circulation. According to present ideas, the amount of physical exercise that the patient can perform without causing rapid heart action, or dyspnea, or undue fatigue, should guide the physician in his prescription of rest. If it is found that he can perform mild physical exercise, either walking on the level at an average pace for a quarter of a mile, or climbing a flight of stairs, without bringing on palpitation, or shortness of breath, or fatigue, or showing a markedly increased heart rate or objective dyspnea, then there is certainly no need for rest in bed. The only gain from this is to keep the patient's activity below the point where the demands on the heart approach its capability, and this can be met for such patients by keeping them in their rooms or in the house.

If a patient is able to proceed about the duties of his occupation without eliciting abnormal fatigue, or palpitation or a sense of dyspnea, it will not be necessary to take the patient away from his occupation. This applies to any occupation, whether it be administrative, clerical or physical in nature. Remember, though, when considering occupation, that mental stresses by their ability to raise the blood pressure put a strain upon the circulation, just as does physical exercise, and if a patient shows a tendency to spells of impatience or annoyance or anger, his heart may come to harm through these.

EXERCISE.

Although too much exercise may be harmful, yet when properly regulated to the patient's ability it has been found to have a definite therapeutic value. It has been found—and this aspect of the treatment of chronic cardiac patients has had a great impetus during the last five years—that if a patient will regularly take an amount of exercise with which his heart is well able to cope, the result will be an increase in his ability to take exercise. There is not only an increase in the strength of the skeletal muscles, but also an increase in the ability of the heart to carry on the circulation under the extra burden of physical exercise. There is an increase in the cardiac reserve (1). This treatment by exercise will be beneficial to cardiac patients who are able to be out of bed and to walk about the house without undue discomfort, or who are able to perform any greater amount of exercise. It does not seem to be beneficial when pain results from the exercise, and caution must be used in prescribing it for patients in whom it leads to an increase of the blood pressure to 275 mm. or more. Though I have never heard of its occurrence, there may be some danger of causing cerebral hemorrhage in these patients.

The first step in this treatment by exercise is to determine what amount of exertion can be performed without causing the signs of circulatory insufficiency which have been mentioned, a persistent palpitation and rapid heart action, and persistent dyspnea. The patient should be tested by the physician, made to climb a certain number of steps at a definite rate, or to swing a ten pound or twenty pound dumbbell a number of times, and his reaction to the exercise should be carefully noted. Note the pulse rate, the objective dyspnea, the presence or absence of facial evidence of distress, and particularly whether these persist for over two minutes or subside promptly. The amount of the test exercise should be increased after a short rest, and so on until a point has been reached at which the patient has been overtaxed to a slight degree. I have never seen any harm come to the patient from such testing, but in order to avoid harm the successive increases in the amount of exercise should not be too abrupt and also the patient should be watched while he is exercising for evidences of distress.

When a test exercise has been found just to overtax the patient's circulatory ability, we may feel certain that one third of this will be well within his power, so that if he is overtaxed by ten or fifteen or twenty swings of a ten pound dumbbell, then three or five or seven swings will not be difficult for him. We may prescribe, then, this amount of exercise, to be followed by a rest of five minutes, with the patient seated in a chair. The exercise and rest period should be repeated until it has been done six times, making a total exercise period of about a half hour, and there should be three or four of these during the day. It is better, if the patient is found to call for only three or four swings of a ten pound or twenty pound dumbbell, to reduce the weight of the dumbbell so that the number of movements can be increased, thus giving a somewhat longer duration to the exercise. After a patient has used a given exercise for from five to nine days, he should again be tested and, if advisable, the exercise should be increased.

There is a great physical and mental stimulus from outdoor exercise which should be made use of whenever the patient is able to leave his house to go to a pleasant place for walking. There are many places in Central Park and on Riverside Drive which are very well suited for these patients because of the slight grades and the frequent benches on which they may sit and rest until any unusual dyspnea or palpitation passes off.

The patient must be carefully studied when at the stage in which walks are prescribed. Different patients not only vary in their ability to exercise, but also in the amount of attention which they will pay to the symptoms arising from cardiac overstrain. The complaints are not always proportional to the severity of the symptoms, and so it is often necessary to tell a patient to do more or to do less than he will feel that he is capable of, using as a basis for our directions not so much what he says about his ability as the degree of reaction which we observe in response to a test exercise. The game of golf will be found a useful exercise as the patient's condition improves.

DIET.

Throughout this régime the diet must be sufficient to supply the patient's needs. Restriction is not necessary, but the diet must be agreeable to the patient, and any special articles which disagree must be omitted. Patients who are overweight must be gradually reduced to what is normal for their height, for adiposity seems to be a very considerable handicap to a heart which is working near to the limit of its powers. Do not attempt the reduction too abruptly, for if the body is to be starved the heart will be starved also. We do not desire to reduce the strength of the heart muscle. In the moderate sort of heart failure under discussion here, I have never seen any benefit from a salt free diet unless the patient also showed signs of renal disease.

(*To be concluded.*)

Unsuccessful Result Following Transfusion with Immunized Blood in a Case of Infectious Endocarditis.—Louis A. Levison (*Journal of Laboratory and Clinical Medicine,* January, 1921) reports a case of infectious endocarditis in a man twenty-one years old, in which blood culture showed a pure growth of Streptococcus viridans. In view of the absence of any known therapeutic aid for the patient's desperate condition, it was decided to prepart a vaccine from the streptococcus and immunize a donor with it, after which repeated transfusions of the immunized blood were given the patient. The donor received the vaccine five times before the first transfusion and was considered to be immunized, because a reaction consisting of a rise in temperature, chill, malaise, and a leucocytosis followed each injection. The patient was given four transfusions by the citrate method, receiving 2,200 c. c. in all. Beyond the maintenance of the patient's strength, and the relief of the anemia, the transfusions were unsuccessful, as the patient died.

Heart Murmurs and Heart Disease in Children.—G. Werley (*Southwestern Medicine,* July, 1921) remarks that the history is all important in making a diagnosis of heart disease in children, especially where the history of rheumatism is lacking. Acquired valvular disease is extremely rare in the first three years of life and uncommon up to the fifth year. A systolic murmur alone is never sufficient to establish a diagnosis of valvular heart disease. The heart of the child is extremely sensitive to vagus influence, and the irregular pulse of a child is more frequently physiological than pathological. A large collection of statistics shows the comparative rarity of acquired valvular disease in children; much less than one per cent. of those under ten years of age. In children pain about the heart, palpitation, shortness of breath, fainting and the like are generally due to an unstable nervous system and not to heart disease. Diastolic or presystolic murmurs, definite and permanent cardiac enlargement, a heaving apex beat, definite and well marked thrills, heart block not due to drugs, auricular fibrillation are all reliable findings in making a diagnosis of organic heart disease. These are late symptoms and the diagnosis should be prospective heart disease.

Blood Viscosity and Blood Pressure.—D. Murray Lyon (*Quarterly Journal of Medicine,* July, 1921) bases his conclusions on a study of the viscosity of the blood and the blood pressure of eighty normal persons, and upwards of four hundred patients suffering from a wide range of pathological conditions. He found that in health a close parallelism exists between the increase in blood pressure and blood viscosity up to middle age, but after this the agreement ceases, as the viscosity readings fall in keeping with the values for the red blood cells and hemoglobin, while the blood pressure figures rise as the vessel walls become more resistant to compression. In disease the relationship is much less evident. Lyon concludes that the viscosity of the blood is a very important factor in maintaining the blood pressure, but that alterations in the thickness of the blood can be easily compensated for by the body, and hence only in exceptional cases does this control show itself in an altered blood pressure.

Unilateral Alterations in Blood Pressure.—Edgar F. Cyriax (*Quarterly Journal of Medicine,* July, 1921) reports in this second communication observations on blood pressure in a second series of 128 cases, including both unilateral and bilateral conditions, acute, subacute, and chronic. He states that the results found in surgical cases, as given in his previous report, are fully confirmed by this series, the only exception being that the differential blood pressure sign was found also to occur frequently in operations upon structures in the median line. It was also seen frequently in unilateral medical cases, and in bilaterally equal and constitutional affections. Cyriax says that neglect to exclude the presence of the differential blood pressure sign may easily lead to erroneous conclusions as to the state of circulation.

Quinidin in Treatment of Auricular Fibrillation.—Per Arnell (*Hygiea,* August 31, 1921), studying a series of nine cardioarteriorsclerotic patients of rather advanced age, found decided benefit from quinidin in four, the arrhythmia ceasing either permanently or temporarily. Begin with a dose of gm. 0.20 the first night, and if well borne, gm. 0.40 is given three times a day until rhythm is restored, after which the dose is reduced during a week to twice daily and once daily. Usually ten to twelve days are needed, and the change of rhythm occurs about the third to fifth day. While quinidin is in some of its pharmacodynamic properties directly opposed to digitalis, it has been found by the author, as well as by others, that a preliminary administration of digitalis is an adjuvant in so far as it fortifies the heart muscle, while the former controls the vagus influence, assuming, as he does, that auricular fibrillation in some of its phases is caused, not altogether by pathological changes or degeneration of the myocardium, but is rather of nervous origin. Otherwise the long-continued improvement observed in his cases could not be accounted for; in one case normal cardiac rhythm has persisted seven months without quinidin. Excepting slight nausea at times no untoward effects were noticed. The author also cites other observers who have studied the effects of quinine and its derivatives on the heart, with results as gratifying as his own.

Proceedings of Societies

ASSOCIATION OF AMERICAN PHYSICIANS.

Annual Meeting Held in Atlantic City, N. J., May 10 and 11, 1921.

The President, Dr. W. S. THAYER, of Baltimore, in the Chair

Address of the President.—Dr. W. S. THAYER, of Baltimore, in his presidential address referred to the loss sustained by the society during the past year in the death of two of its best known members, Surgeon General Gorgas and Dr. Samuel J. Meltzer. He presented a brief summary of the work accomplished by them in the interests of science, pointing out that these two men, so different in many respects, represented the spirit which brought the association together on common ground. The clinician, the physiologist, the pathologist, the chemist, were united by a common bond—to contribute to the advancement of medicine in its broader sense. If the association continued to fulfill the conditions of its founders, it would always consist of just such a group of students representing many special interests but united in the common study of physiology, pathology, and therapy.

Experiments in Epidemiology.—Dr. SIMON FLEXNER and Dr. H. L. AMOSS, of New York, presented the results of studies in epidemiology which consisted of artificial control by a prearranged plan of epizootic outbreaks. These were considered as epidemics. The organism used was Bacillus typhi murium which produces epidemics among mice. The mice were assembled to represent a village. One hundred normal mice, free from Bacillus typhi murium, were put in twenty cages. Ten mice were then fed a heavy suspension of the organism, and were put among the hundred normals. Feeding and cleaning were done in one direction by one attendant, but it was found that the epidemic did not progress in the line of feeding. Roaches and flies were eliminated. Eight of the ten infected mice came down, and seven of the normal mice, by contact. After thirty days, another series of mice was brought in. Those previously exposed, and the new ones, were observed, and the epidemic progressed in a series of waves, the crests of which became smaller. Among the first exposed the deaths were higher and more frequent. After two weeks there were no more deaths, and the mice were stocked up to 300 again. The mortality now was sixty-eight per cent. Originally it was fifty-eight per cent. They were again restocked, and the mortality now was fourteen per cent. It was supposed that greater mortality would occur among new arrivals, but it was about the same among old and new. The number of carriers was found to be in inverse proportion to the death rate—the higher the death rate the fewer carriers. The carriers had agglutinins in the blood, but these were not protective against a new epidemic wave. The strains of organisms had different virulence at different heights of the disease.

Secondary Mould Infection of the Lung.—Dr. CHARLES P. EMERSON, of Indianapolis, said that penecylium infection was not supposed to be pathological, but two cases were reported which occurred in a man of fifty-three and a woman of thirty-four, both treated in sanatoria for pulmonary tuberculosis. The first patient suffered from tickling of the throat, his sputum contained "slugs," and he had acute spells of respiratory distress and dyspnea, but no fever and no loss of weight and strength. His appearance suggested the last stages of fibroid tuberculosis, but the sputum continually produced mycelium and from x ray examinations a diagnosis of mould infection of the lung was made. The culture always gave penecylium. Potassium iodide was administered and the man did fairly well, was able to work and his respiratory distress was slight. The second patient was sent to Colorado, although she protested that she always felt well. Penecylium was always found in the sputum cultures. The question was whether penecylium could be a primary invader of the lung; if it was secondary, to what was it secondary? Great caution must be taken in not confusing these cases with tuberculosis, and sending the patients to sanatoria where they were exposed to the danger of contracting that disease.

Disseminated Subcutaneous Sporotrichosis.—Dr. L. M. WARFIELD, of Milwaukee, reported a case of disseminated subcutaneous sporotrichosis with lung metastasis. He said that perhaps no more than one hundred cases of this condition had been reported in this country. The organism was usually saprophytic, but sometimes pathological for man. It occurred on bark, hay, decayed vegetables, etc. There were four forms: 1, localized with chancre; 2, disseminated gummata with multiple subcutaneous nodules; 3, disseminated ulcerated, with multiple lesions simulating tuberculosis or syphilitis; 4, extracutaneous, in the periosteum, eye, or internal organs. Cases reported were from unique conditions, such as bite of a hen, of a horse, of a parrot. It often started with a nodule on the finger, which was disseminated by the lymph channels. In the author's case, the patient, a colored man, had followed the races as a stable boy, had had venereal disease, had a swelling on the top of the right foot, which broke down, and other lesions occurred, with nodules all over the body. There was a four plus Wassermann, leucocytes 17,000. Treatment consisted of intensive administration of potassium iodide. The patient became weaker and died. At autopsy a nodule was found in the right hylum of the lung, which produced sporotrichosis. Dr. Warfield said that the organism grew best at 37.5° C., and was pathological for white rats and rabbits. In lung conditions the organism was found in the sputum. The lesions closely resembled those of syphilis, and were misleading on account of the giant cells. Cases were not usually fatal. The diagnosis must be correctly made and potassium iodide administered.

Symptomatic Treatment of Pneumonia.—Dr. James H. Means and Dr. A. L. Barach, of Boston, said that to apply correctly a specific therapy in pneumonia one must visualize the morbid anatomy and functional pathology. In analyzing pneumonia, one saw that it was a respiratory battle. Dyspnea would arise when the demand for ventilation was greater than the supply. What called for greater ventilation? There were several reasons: 1. metabolism was increased; 2, acidosis was often present; when there was nonvolatile acid in the blood the carbondioxide must be kept lower; 3, there was anoxemia; 4, deficiency of blood flow, which must be compensated by hyperventilation of the lungs, the enlargement of the heart in these cases perhaps being explained by the asphyxia; 5, marked reduction of the vital capacity of the patient because part of the lung was consolidated; 6, abdominal distention might be present, limiting the respiratory excursion and causing rapid shallow breathing, the most expensive for the organism, as it required more work and increased anoxemia.

There were two ways of combating these symptoms, either reducing the demand or increasing the supply of ventilation: 1. Alter metabolism and correct acidosis by giving alkali to ensure normal hydrogen concentration of the blood. Sodium carbonate could be used even if there were no free carbonic acid, because alkali tolerance was increased in pneumonia. 2. Oxygen therapy could be used to improve blood flow, especially in anoxemia. 3. Remove abdominal distention and improve the pulmonary bellows. The correction of acidosis and anoxemia would improve chances of recovery.

Factors Influencing Recovery and Resolution in Lobar Pneumonia.—Dr. Frederick T. Lord, of Boston, in discussing the bearing of the evolution of the pneumonic exudate on local chemical factors influencing recovery and resolution in pneumonia, said that he did not want to neglect the humoral aspects of recovery from pneumonia, such as the matter of agglutination of serum which has been proved by Cole and by Cecil, but there were aspects of humoral immunity which were difficult of comprehension. They checked septicemia, but why did pneumonia patients have involvement of successive lobes? Why did they have relapses? Why did the pneumococcus grow readily in pneumonic and postpneumonic serum? There might be local aspects of recovery. This matter was not proved, but it was suggestive. Partial isolation of the lung was important. The pneumonic process went through a certain evolution. There was increased serum at first, and later increased hydrogen ion concentration of the pneumatic lung. The organism might be killed by the hydrogen ion concentration, but, as in the test tube, addition of serum might prolong the life of the organism. Diminution of serum and increased acid might achieve the death point of the organism. The hydrogen ion concentration was important to enzyme action in general. There was a serum and enzyme balance, which probably protected the framework of the lung. When diminution of serum occurred there was setting free of the enzyme. Delayed resolution was caused by too little enzyme or too much serum.

Relation Between Obstruction to Pulmonary Ventilation and the Size of the Lungs.—Dr. C. F. Hoover, of Cleveland, Ohio, said that Biermer had studied asthma in 1875 and supposed it to be a vicious circle caused by active compression of the lung in the expiratory phase. Bronchial spasm was an impairment of the compressibility of the lung. Against his theory were the facts that there might be pronounced emphysema, or expiration might be passive, not active. There might be another phase. After adrenalin the patient was relieved of bronchial spasm, which did not fall under the all or nothing law, but there might be partial spasm or hypertonus of the bronchi. Adrenalin raised the vital capacity with disappearance of the symptoms, and removal of the abnormal respiratory excursion. In experiments on animals active expiration did not produce expiratory dyspnea, and one did not often see incomplete tracheal stenosis. In one patient where this existed there was no change in lung volume. One man had aneurysm of the arch of the aorta compressing the trachea, and he lifted the aneurysm in expiration, which was broken into sharp hisses. The volume of air was not increased in the lung, there was no emphysema. In another patient with aneurysm of the descending arch of the aorta with compressed bronchus, on lying down there was reduction of the vital capacity to 1,200 c. c. The left diaphragm lifted and then the right. The left lung was stabilized, but when upright they were equal. Lying down the patient had expiratory dyspnea. Emphysema was not equally distributed over the lung, because there was not equally distributed hypertonus of the bronchial tree. Adrenalin affects the entire bronchial tree, but clinical asthma affected parts of the bronchial tree unequally.

Bactericidal Activity Against Bacillus Diphtheriæ of the Whole, Coagulable Blood of Immunized Animals.—Dr. S. Solis Cohen and Dr. Meyer Solis Cohen, of Philadelphia, said that to recall past studies the late Dr. Heist showed that there resided in the blood of animals a property inimical to the growth of organisms to which the animal was immune. That was confirmed by Kohler. This substance was present in the whole coagulable blood of the immune animal; it was not demonstrable in serum, in defibrinated blood, in citrated blood. When injected to cause artificial immunization, the same property appeared in the immunized animal. Two methods were used: 1, the time at which the organism was killed in the tested blood; 2, the dilution of culture in which growth could be proved. Diphtheria presented a different problem. The immunity was antitoxic, not antibacterial. Two points were discovered: 1, bactericidal power against Bacillus diphtheriæ was found in the blood of the rat; 2, in human beings subjected to the Schick test, in some there was bactericidal power, but there was no correspondence between immunity by the Schick test and the bactericidal power. Dr. Park thought the recovery from diphtheria was by bactericidal substance, not by antitoxin, as those recovering had a positive Schick test. The horse was tested to see if the bactericidal power corresponded to the antitoxic immunity and the antitoxic power in the blood was due to antitoxic immunity.

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NEW YORK, WEDNESDAY, JANUARY 18, 1922.

Causation of Etiology of Infectious and Parasitic Diseases.—Dr. THEOBALD SMITH, of Princeton, N. J., said that etiology was the study of the entire field of medicine from a special point of view. If we could comprehend the cause, the next step was to intercept it. Observation of causes must be associated with experiment. Nature was continually experimenting, observing, and taking notes. To interpret correctly we must produce natural phenomena as far as possible. A stage had been reached when the conditions influencing disease could be accurately measured; we must consider them as entities: 1, heredity; 2, environment; 3, parasitism. These three factors reacted on each other and the animal body reacted on them. In parasitism we had two bodies reacting on each other. The unicellular organism used to be considered the beginning and end of disease, now we knew that immunological reactions of the host play an important part. The study of epidemiology from a biological viewpoint would help in clearing up causes, and would show what were the influences besides the infective agent. The formidability of the invader was due to its power of multiplication in the host. Some were adapted to one host only, others led a saprophytic existence, or became saprophytes. The smallpox parasite was specialized for one host. Other organisms were predatory, others were surface parasites. Four conditions obtained: 1, entry; 2, multiplication; 3, escape; 4, transfer to another host. Infective parasites left the body in armies, but few entered. Penetration into the normal body was unknown, and traumatism must play a part in making tissues vulnerable. Multiplication and escape were also essential to the parasite. Superficial tissue allowed of ready escape, but deep tissues were unnecessary to the organism, as they did not provide escape. Comparative pathology might furnish many gaps in our knowledge of parasitism.

Dr. A. R. DOCHEZ, of Baltimore, in discussing the subject, said that infectious diseases had reached a fairly stable state, and further modification did not seem likely, as few diseases had died out and no new ones were added. Some species of bacteria had become saprophytic. Some parasites, such as Bacillus coli and Bacillus tetani, had found favorable conditions and had become specialized. Why did not all parasites reach such a stage? Was there a change in the suitability of the host? Each group seemed to have a pathological member which caused disease, and the pathogens had often to be tested by immune reactions to distinguish them. As the organism became a permanent parasite and resistance of the host increased. The pneumonia organism was the same all over the world, except in South Africa where the species affecting the negroes was more virulent, probably having found a fertile soil. The organism had taken advantage and has become established as a parasite. There was a struggle between organism and host, the former having power to multiply and invade the tissues, and some organisms possessed toxins to break down the cells of the host.

Animal passage increased the virulence of organisms, but when very virulent they destroyed the host, and with it themselves. Often the ground was prepared by a primary virus, before they could manifest their activities. This was seen in the war, when virulence was high on account of passage from individual to individual in measles and pneumonia, and in the recent influenza epidemic. Three factors might account for this: 1, increase of the power of the parasite; 2, decrease of power of the host; 3, favoring circumstances which alter environment. In regard to epidemiology there were two or three factors: 1, infection in a fixed population tends to disappear; 2, continuous addition of new, susceptible material prolonged the period of infectivity because the introduction of new material gave the parasite a chance to refresh its invasive powers. The study of the effect of the organism on the host would answer the question whether some were primary invaders or were dependent on others.

Dr. HANS ZINSSER, of New York, said he believed that the correlation of the enormous amount of material available was the next step in the work of the immediate future. In the study of immunological processes particular attention had been given to antigens and antibodies. In regard to the phenomenon called hypersensitiveness and the study of exotoxins and endotoxins, products had been found which appeared early in the cultures. There were two types of skin reactions: 1, sensitiveness to horse serum, developing early and passing quickly; 2, the skin reaction primarily associated with infection, a later reaction with necrosis. This applied to guineapigs and man. The question was asked whether either of these reactions corresponded to anaphylaxis. The skin reaction to horse serum was parallel with the general development of anaphylaxis, but the tuberculin reaction in guineapigs was different. Both reactions might be seen in the same animal, but independent of each other. Typhoidin and mallein reactions were infective.

(To be concluded.)

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Nutritional Treatment of Tuberculosis*

By CLEMENS PIRQUET, M. D.,
Vienna,
Professor of Pediatrics, University of Vienna.

We consider tuberculosis a nutritional disease in the sense that the germs of tuberculosis, which are contained in the body of practically every adult inhabitant of a city, are not allowed to spread and to overwhelm the organism so long as this is in a good state of nutrition. We may say that the power of the cells to produce antibodies depends on a certain excess of food. We have no specific food, no certain chemical substance, which protects against tuberculosis, but we know that good appetite for various kinds of food and the satisfaction of this appetite by ample meals are the best preventive and the best cure.

In my opinion, all the cures which in the course of time have been advised for tuberculosis culminate in the therapy of feeding. The patients are sent now to the seashore, now to the mountains, now to the desert, now into a warm valley; all these tuberculosis resorts have in common only the condition that the patients receive good care and, under the influence of change of scene and freedom from home worries, begin to eat. The rest cure in these tuberculosis resorts effects a conservation of energy, while being out in the sun and exposure of the skin out of doors stimulate the appetite and allow an increase of metabolism. Change of location and numerous psychic stimulants may be dispensed with if a definite amount of food is prescribed and if the patients are ordered to take an open air cure combined with suitable rest intervals. The large station for one hundred children on the roof of my clinic in the centre of Vienna, a city so notorious for tuberculosis, furnishes a proof of my assertion. The children remain there from one half to one year or more. They are in the open air summer and winter, night and day, clad in the daytime to suit the temperature and well covered at night. The children soon become accustomed to living in the open. Only during the cold winter nights must the little ones be provided with hot water bottles. The children are indoors only when washing or bathing, at meals, and at school, in all about four hours of the twenty-four. In summer, school is held also in the open air. The most important function of the day is eating, for food is given as a medicine against tuberculosis—not a certain kind of food, but a certain quantity.

How do we proceed to prescribe this food? Let us first consider a patient who comes to my office. Let him be a boy of seven years, pale, thin, with swollen glands and a history of frequent colds. The first thing I do is to give the patient a skin test and to order an x ray picture. After two days he returns showing a positive test and the x ray plate showing an enlargement of the bronchial glands. Conditions at home may be favorable for feeding and open air cure, and I make out an individual prescription for food. I take the patient's height and his weight to determine how many kilograms he is underweight and whether his height corresponds to his age. Then I take his sitting height and find out the pelidisi, comparing it on a table with his weight. The sitting height would be sixty-four centimetres, his weight nineteen kilograms; the pelidisi, therefore, would be ninety. He is about three kilograms underweight. His food requirement will consist of three decinem siqua as the basic minimum, and an allowance of two for muscular movements (partly rest cure), two for gain in length and weight, altogether seven decinem siqua. For the whole day he gets, therefore $64\times64\times\frac{7}{10}=2850.2$ nem. We usually put the requirement for purposes of convenience, at a round number, viz., the nearest multiple of 500; in this instance, 3000 nem, or thirty hektonem a day; of these, three hektonem are given at nine o'clock in the morning, two in the afternoon at three o'clock, and the remaining twenty-five are divided between the three main meals, six o'clock in the morning, noon, and six o'clock in the evening, which equal eight, eight, and nine hektonem, respectively. A schedule is made for time and amount of feedings. In case it should be more convenient for the mother to start the day at seven o'clock, we arrange the meals at 7:00 a. m., 10:00 a. m., 1:00 p. m., 4:00 p. m., and 7:00 p. m. We give the biggest meal, nine hektonem, at noon.

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*Harvey Society Lecture, delivered at the New York Academy of Medicine, December 17, 1921.

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This gives an idea how a day has to be arranged. There is a book of recipes in which the mother finds variations for eight different days. (1)

In the same schedule we take into account the protein. We count the dekanem of protein contained in every hektonem.

TABLE I.

Time of Meal	*Amount in Hektonem*									
7 A.M.	8	100 milk	100 milk	17 sugar	30 bread	8.5 butter	30 bread	20 ham	30 marmalade	
		(300 c water and coffee)								
10 A.M.	3	100 milk	30 bread	40 1 egg	. .	. .	. .	. .	. .	. .
1 P.M.	9	20 flour	7.5 fat	40 meat	40 meat	80 potato	50 green peas 4 butter, and 46 water.	30 bread	20 cheese	150 apple
		(200 soup)								
4 P.M.	2	100 milk	20 cakes	. .	. .	. .	. .	. .	. .	
7 P.M.	8	20 flour	20 flour	20 flour	100 milk	17 sugar	30 bread	8.5 butter	20 honey	
		(200, baked after recipe)								

TABLE II.

2 milk	2 milk	0 sugar	1 bread	0 butter	1 bread	5 ham	0 marmalade			11
2 milk	1 bread	3 egg	. .	. .	. .	. .	. .			6
1 flour	0 fat	4 meat	4 meat	0.5 potatoes	1 green peas and butter	1 bread	4 cheese	0.5 apple		16
2 milk	1 cakes	. .	. .	. .	. .	. .	. .	. .		3
1 flour	1 flour	1 flour	2 milk	0 sugar	1 bread	0 butter	0 honey			6
									Total	42

This gives forty-two dekanem protein in thirty hektonem; this falls between the minimum of ten per cent. (thirty dekanem) and the maximum of twenty per cent. protein (sixty dekanem) and meets, therefore, the requirements.

The feeding cure is combined with a rest cure. The child is left in bed on a porch, in a garden, or on a roof garden for the two first weeks, then allowed to get up half an hour in the morning and in the afternoon for the next week, and after that is gradually left out of bed for longer and longer time. The body weight is taken once a week. If in later weeks the gain is not sufficient, we may go to eight decinem siqua adding three hektonem, i. e., one hektonem to each of the three chief meals, giving for instance, an additional cake of twenty grams at each main meal.

TABLE III.

Sitting height (cm.)	*Hn. per day*	*Nutrition class*	6 A.M.	9 A.M.	Noon	2 P.M.	6 P.M.
			Hektonem at each feeding				
52-56	20	II	5	3	5	2	5
57-62	25	IIa	6	3	7	2	7
63-67	30	III	8	3	9	2	8
68-73	35	IIIa	10	3	10	2	10
74-77	40	IV	11	3	12	2	12
78-82	45	IVa	13	3	14	2	13
83-86	50	V	15	3	15	2	15

In an institution where we have many children, it would be loss of time to compose a menu for each. We simplify matters then in arranging nutrition classes.

NUTRITION CLASSES.

In a ward containing children affected with slight tuberculosis and convalescents from an acute attack of tuberculosis, we put all the children on a diet of seven decinem siqua and differentiate the amounts depending on the sitting height of the children. The children are seated at the table according to the class to which they belong as measured for their nutritional requirements. The food is distributed by means of a graduated dipper for the fluids and a balance for the solids. Bread and cakes have been sliced in hektonem portions. In such a way it is easy to make the children eat all their portions; nothing is allowed to be left. The children have to remain at the table until through. No leaving of remnants is permitted. This results in great economy. No food is turned into garbage. When this system was introduced the man who rented the right of removing the garbage wanted to sue us because he fell short. The whole day is divided into a schedule which is strictly adhered to.

For an institution like a tuberculosis sanatorium in which most of the children come from poor families, and especially in a country like Austria where the whole population is impoverished, it is important to make the hospital diet inexpensive. It may do in an acute illness to "feed up" the child with eggs and white meat. Tuberculosis, however, lasts for years. The tenacity for the spread of infection from a tuberculous focus lasts certainly much longer than the duration of the child's stay in the hospital. If we should spoil the child with nice and tasty food, the result would be that he would no longer want the poor food he received at home. In a short time all the gain in weight obtained at the hospital would be lost.

As to the results of our feeding method in tuberculosis, I may say that we are extremely well satisfied. Having advocated that method, we gradually forgot about all other methods of cure. We do not use tuberculin treatment any more, though we were very fond of it before. We do not use any other specific medical treatment. Our prognosis in a case of tuberculosis becomes more and more optimistic. We used, for instance, to consider pulmonary tuberculosis in the case of girls between the ages of eleven and fourteen as almost fatal; now we see many of these patients recover.

Our greatest pride is in the results obtained from the treatment of children suffering from tuberculoma of the brain. I will call attention especially to the case of one boy who suffered from severe epileptic attacks and presented symptoms of cerebral pressure. The diagnosis of a tuberculous brain tumor had been established as far as was possible in the living subject. The treatment was conducted at my clinic from January to November, 1918, and was continued at home by the mother. The treatment resulted in a perfect cure. I saw him on the last occasion in the spring of 1921, when he was healthy and vigorous and perfectly normal mentally. There is no reason why a tubercle in the brain should not be as readily curable as tubercles in other organs which, as we all know, are susceptible to cure. The chief difficulties to overcome in such a case are the tendencies to nausea and vomiting and lack of appetite. These symptoms are controlled only by an exact regulation of the quantity of food combined with skill and scrupulous exactness in its administration.

REFERENCES.

1. Pirquet: *System der Ernahrung*, 4 Bände. Berlin: Julius Springer, 1911-1919. The third part is a book of recipes.

The Feeding Method of the Pirquet School*

By HARRY APFEL, M. D.,
Brooklyn, N. Y.

It is important to divide this subject into two parts, the first part to deal with the Pirquet method of estimating the food required for the daily consumption of a given patient, which has been named the nem method, and the second with special food formulas employed by the Pirquet school.

THE NEM METHOD.

It may be advisable at the outset to state that the nem system does not designate any special food or formula for the feeding of the infant or child. It does not designate how much fats or carbohydrates or proteids the child should get. It simply is a means of estimating and calculating the amount of nutrition the prescribed food formula shall contain. It may also be in place to note that this method is not only applicable for the feeding of children but that it may be utilized for the feeding of adults as well as for premature infants. While to review all that Pirquet has written in his four volumes (1) would indeed be time well spent, on account of the limited space allotted to me the essential principles only of this feeding system will be discussed.

Pirquet laid down a few fundamental principles which he has carefully worked out and which must be followed in order to be able to employ his feeding system intelligently.

PIRQUET'S PRINCIPLES.

1. That whatever food we employ, we must compare its nutritive value with that of mother's milk, the basic food. The author argues that mother's milk which answers satisfactorily to all body requirements for the growing child during its first year of existence, must consist of correct and proper food constituents, hence the term nem which is composed of the first letter of each of the three words, nahrüng einheit milch (nutrition similar to milk), or milk nutrition value (Nobel).

2. The amount of food one requires and will be able to assimilate in the course of twenty-four hours is in exact proportion to the square surface of one's intestinal tract. If food in excess of this quantity is ingested it will not be absorbed, but will pass out of the intestinal canal as so much waste matter.

3. The square surface of the intestinal canal can be obtained from the *sitz höhe* or the sitting height of a given patient.

Studying the various measurements of the digestive tract as worked out by Vierordt (2), Gundobin (3) and others, Pirquet came to conclusion that the square surface of the intestinal canal was equal to the square of the sitting height. The *sitz höhe* (sitting height) is obtained by measuring the distance from the surface the patient sits upon to the topmost part of his skull (patient sitting undressed). In the case of an infant, it is best to lay the patient on its back, the thighs flexed with buttocks against a fixed board, measuring from this board to the top of the patient's skull, employing the metric system. The rule is, sitting height square (siqua) is equal to the square surface of the intestinal canal.

4. According to the Vienna school, it matters little what food we choose for our patient as long as the food contains as many nems as the number of square centimetres of the patients *sitz höhe*, the food quantity being weighed by the metric system. One gram of mother's milk, the basic food, is equal to one nem, which is our measure. That the prescribed food shall contain at least ten per cent. and not more than twenty per cent. of proteids is the only condition that the author makes.

The author goes further and says that the nem worth of every individual is not absolute but varies between a maximum and a minimum level, the latter being the quantity of food that the individual requires when he is in a state of rest, in bed and kept warm. This figure is three tenths nem or three decinem siqua. This measure may be recommended at certain times when body exercise is very limited or when it is necessary to give the digestive tract a rest, and only for a limited time. The former is one nem or ten decinem siqua, which means so many nems to the number of square centimetres of the patient's sitting height. This amount of food is not usually employed, but only in exceptional instances, and when putting on weight is essential. There is a point between these two extremes which the author has named the optimum scale, and which is an arbitrary point. This is between five and seven decinem siqua (patient's sitting height square). This measure is the one recommended by the author for the average case, and includes three tenths minimum, plus one tenth for exercise, one tenth for growth and one tenth for taking on weight, which makes a total of from five to seven decinem siqua (five tenths to seven tenths nem of patient's sitting height square).

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*Read before the Medical Society of the County of Kings, at its joint meeting with the Brooklyn Pediatric Society, October 18, 1921.

ADVANTAGES OF THE SYSTEM.

With this method of feeding one need not guess how much food a given child needs nor do we measure the food requirements according to the age of the child. Pirquet's aim was to work out a scientific and at the same time practical method which would be easily understood by the laity as well as by the doctor.

Pirquet contends that the term calorie is strange to the average mother and, therefore, she is not likely to be interested and probably will not carry out our orders. With this system, however, we tell the mothers after we have calculated the quantity of food required, "give as much food as is equivalent to a litre of milk" (basic food), for instance. She immediately forms in her mind a concrete idea. She knows exactly what a litre of milk looks like and will, therefore, take an active interest in the feeding problem of her child. Furthermore, Pirquet asserts, we must acknowledge as a fact that the feeding of children after one year of age depends largely upon the appetite and whim of the child or its mother; that few children are still getting the correct number of calories after the end of the first year of life. From then on only the quality of its food is being considered, not the quantity. This statement we must admit carries a good deal of truth. The usual directions to the mother are, "give the child some vegetables, some bread, some meat," leaving out the quantity.

This method is not only applicable to the feeding of a single individual, but can also be used in the feeding of large groups of children. The American Relief Administration which has for its object the feeding of four hundred thousand children in Austria, is employing this system with excellent results. Nobel has employed it in the feeding of a large army of soldiers with similar results.

EXAMPLE.

For a child, one year of age having a sitting height of forty-five cm.

Siqua (sitting height square) is 2,025.

10 decinem of siqua (the maximum) food requirement (In round numbers)	2,000 nem for 24 hrs.
7 decinem of siqua (the optimum) food requirement	1,400 nem for 24 hrs.
3 decinem of siqua (the minimum) food requirement	600 nem for 24 hrs.

Knowing his food requirement (the number of nems) the rest is a matter of arithmetic, after we have decided upon the form of food we wish to give to our patient. If it be milk we decided upon, it would be quite simple. One gram of milk being equal to one nem, it follows that the patient needs for the twenty-four hours:

2,000 grams of milk for the maximum figure
1,400 grams of milk for the optimum figure
600 grams of milk for the minimum figure

OTHER FOODS.

This would be quite simple, if we were always concerned with milk and no other food. When we choose to give the patient some other form of food, we must calculate its food value by comparing it with the milk (finding its nem worth in the Pirquet table, prepared for this purpose). For example, one gram of farina is equal to six nems. In order to substitute farina for six grams of milk we would only have to give one gram of farina, which is also six nems.

MENU FOR CHILD SIX YEARS OF AGE, WHOSE SITTING HEIGHT IS SIXTY CM.

His siqua is....................3,600
Food required—7 decinem siqua (7/10) 2,520 nem (optimum figure)
In round figures............25 hektonem is the daily requirement
100 nem = 1 hektonem (H N)

The child receives five meals, twenty-five hektonems, as follows:

Meals	*H.N.*	*Food in grams*
8 a.m.	7	Bread, 30; milk, 100; egg, 1; butter, 8.5; sugar, 17.
10 a.m.	2	Bread, 30; marmalade, 30.
1 p.m.	7	Bread, 30; meat, 40; potatoes, 80; butter, 80; pudding, 30; spinach, 150.
4 p.m.	2	Cocoa, 120; cakes, 50.
7 p.m.	7	Egg, 1; bread, 30; butter, 8.5; fruit, 1.75; milk, 100.

The objection to weighing every article of food is soon overcome when the mother becomes accustomed to the quantity required or by measuring instead of weighing. (In a vessel of known quantity.)

There is a time when we may decide to feed the patient on milk but in concentrated form, so that each gram shall be equal to, double of, or one and a half times plain, whole milk. In this case enough sugar or flour should be added to the required amount. In other words, the child will then receive five hundred grams of milk which is equal to twice the number of nems of plain milk, made so by the addition of such articles as sugar or flour to the required amount. Such feeding is spoken of as double nutrition.

When it is so concentrated that each gram is equal to one and a half nem we speak of it as sesquibo, or food that is of one and a half nutrition.

EXAMPLE

1, Milk 500 grams (1½ liter)......500 nems (equal nutrition—sibo)
2, Milk 500 grams plus 65 grams of sugar, 1,000 nems (double nutrition—dubo)
(1 gram sugar—6 nems)
3, Milk 500 grams plus 41.6 grams of flour, 7.5 nems (one and a half nutrition—sesquibo)

SPECIAL FOOD FORMULAS.

Perhaps the most radical move that Schick made was in the feeding of premature infants and the newborn. Schick's observations on the feeding of the newborn led him to the conclusion that the vomiting during the first, second and third days of life was physiological and therefore not a contraindication to feeding. The baby will not refuse the breast if fed artificially while waiting for the mother to get her breast secretion. To quote Schick (4), "The child should not be expected to pay with starvation the price of learning how to nurse at the breast." Owing to the fact that the absorbing surface of the digestive tract is very small at birth, the baby must be fed very concentrated milk in small quantities, ten grams at a time, every two hours. He argues that the premature infant can ill afford to stand weight loss. While waiting for a sufficient supply of mother's milk, it is necessary to give the baby frequent feedings of concentrated food. He begins with human milk plus seventeen per cent. cane sugar, quantity depending on the individual baby's sitting height.

Schick writes on this subject (4): "After feeding this way sixty-two premature infants, I have lost all fear for the concentrated sugar and milk mixtures." (This was written over a year ago.) He does fear the low proteid content, hence, he recommends, if concentrated feedings must be continued for a long time, it should be done with cow's milk, which has a larger proteid content (cow's milk has three and two tenths per cent. of proteid, whereas mother's milk contains only one and seven tenths per cent. proteid).

EXAMPLE.

A newborn infant weighing 1,600 grams; its sitting height is 26 cm. The sitting height's square would be 676—
3/10 or 3 decinem siqua = 200 nem (round numbers)
100 gms. of milk = 100 nem
17 gms. of sugar = 100 nem
Total = 200 nem

The same principle of giving small, concentrated feedings is employed in cases of severe vomiting and also for pylorospasm, as well as in similar cases where we feel that the patient will not tolerate large quantities of food. We then give small, concentrated feedings, from ten to twelve during the twenty-four hours.

All the newborn children in the Schauta clinic are started on such mixtures supplementing mother's milk until the end of the first week, when the mother gets sufficient milk in the breasts.

The important point the Vienna School makes is that the food should be administered in as concentrated a form as possible.

In the treatment of scurvy, Nobel (5) makes the statement that these patients when fed on concentrated food, even though antiscorbutics, such as orange or potato juice, were not a part of the diet, improved rapidly and the symptoms of scurvy disappeared readily. I have seen several severe cases of scurvy treated by Schick, with boiled milk to which had been added seventeen per cent. of sugar and the child rapidly improved. These children had not received any orange juice. Schick makes the point that the important factor is the change of diet and enough should be given of whatever food we may choose.

For a premature infant weighing 1,600 grams with a sitting height of twenty-nine cm., the minimum would be three tenths siqua which equals 252 nems; in the form of human milk, 130 gms. plus twenty-two gms. of cane sugar. This formula is divided into twelve meals for the twenty-four hours, giving a total of 250 nems. I have seen children fed on fat free diet, carbohydrates taking its place with good results.

Professor Pirquet has coined a new lexicon which has more objectors than admirers. The author does not insist that this new nomenclature must be employed in adopting his feeding system. One must, however, regard these new terms as helpful tools especially adopted for the carrying out of a new piece of work. One can get along without them but the work is greatly facilitated with them. Some of the terms are as follows:

TERMS FOR THE NEW SYSTEM.

Sibo—(Simplex bovinum) whole milk. 1 gram = 1 nem.
Siqua—(Sitz-hohe quadrat) sitting height square.
Dubo—(Duplex bovinum) whole milk and seventeen per cent. sugar, 1 gm. = 2 nem.
Tribo—(Triplex bovinum) whole milk and thirty-four per cent. sugar, 1 gm. = 3 nem.
Duma—(Dopple nahrung made of mager milch and sugar), 1 gm. = 2 nem.
Dufa—(Dopple nahrung made of milk and farina) 1 gm. = 2 nem.
Dufam—(Dopple nahrung made of mager milch (skimmed milk) and farina) 1 gm. = 2 nem.
Kuhrog—(Whole milk plus cane sugar) either as simple nutrition or double nutrition.

It may be advisable in closing to mention the fact that those other men in Vienna who, even though they have not as yet adopted the nem feeding system in their institutions, do, however, indicate on their bedside charts the food requirements in terms of nems and then convert these into calories (one nem=.65 calories). This I have seen on the charts in the Wilhelmina Spital as well as in the Reich's Anstalt, although the men of both of these institutions are outspoken enemies to the nem system.

RÉSUMÉ.

This feeding system of the Vienna School, especially for the premature infants, is somewhat new, but at the hands of our colleagues abroad it has proved successful, and therefore deserves a trial in our children's hospitals. While the figures and measurements that are involved with the nem system of feeding is somewhat confusing at first, it should be stated that this becomes routine and very simple, after one becomes accustomed to its use and acquainted with the marvelous tables the author has prepared for this purpose. The average nurse can do all the figuring after a little practice. Although no English translation of Pirquet's original work has as yet been published, the work has been translated and will be published in the near future. I hope a fair idea of this subject may have been gained from this brief presentation of its main features. It might be suggested that some of the men who have a large number of infants in their service might take the initiative and introduce this method of feeding on a large scale in this country, and thus give it a fair trial and report the results to the American profession.

REFERENCES.

1. Pirquet: *System der Ernahrung.* 4. Bände. Julius Springer, Berlin, 1911-1919.

2. Vierrordt: *Anatomische Daten und Tabellen*, Jena, Fischer, 1906-S. 117.

3. Gundobin: *Allgem. med. Verlaganstalt*, Berlin.

4. Schick, B.: *Ernahrungs studien beim Neigeborenen*, Springer, Berlin, 1920.

5. Nobel: *Zeitschrift für Kinderheilkunde*, vol. xxxviii,

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Calories for Children*

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Popular impressions with regard to the dietetic habits and food needs of individuals are usually erroneous. In one respect, however, they rarely are wrong, that is, with regard to the admittedly enormous demands of the growing child for food. When it is considered that the food for the growing child must supply not only the energy for life but that for the always present intense juvenile activity and, in addition, the not inconsiderable amount of energy needed for growth, the large food intake of children is not surprising. It is obvious that the healthy, normal child must be active and must have provision for growth. Hence any consideration of the food needs of children, at least under normal conditions, should take account of both the normal drive for physical activity and the normal requirement for growth. Still, economically one may look upon the food needs of children from two distinct viewpoints; first, what is the food intake required for full activity with best growth, and second, what is the irreducible minimum or smallest amount of food needed by children in case a curtailed supply of food makes an adjustment of the food intake necessary? This latter point has a particular bearing upon the conditions which prevailed generally in all countries except America during the war, and which obtain at present in only too great a measure in a large number of countries, particularly Germany and Austria, and in famine districts. So it becomes necessary to examine more closely what are the food needs of children.

MINIMUM FOOD REQUIREMENTS.

It has been the common custom to express the caloric requirement of children in some fraction or factor based upon the caloric requirement for the adult man, the older standards using, roughly, the body weight as the chief index. Thus, a boy with one half the body weight of the average man would be presumed to have a caloric need of approximately one half that of the man. But in a closer analysis of the situation it becomes necessary to subdivide the food needs of children and take account, first, of the food required for the minimum maintenance of the body without providing for excessive activity or, indeed, for growth. In other words, what food is required to make up for the body material actually broken down or burned up during the course of the day in the process of oxidation, the end result of which is expressed in terms of heat?

With a quiet child less food would obviously be needed than with an active one, and the minimum requirement would obviously involve the quiet child. How are we to determine the minimum needs? For this purpose we must study the children under conditions where there is no muscular activity and where all other extraneous factors that would influence metabolism are repressed or absent, such as, for example, psychical excitement, undue cold such as to produce shivering, and the influence of the digestion of food. From the viewpoint of pure physiology it is of great importance to be able to compare, if possible, the minimum food needs—or we may now supplant this expression with its equivalent, heat output—of children of varying ages, and this comparison can only be made on the basis of the minimum requirement. This may be stated to be the overhead charge for running the human machine, or the irreducible minimum. Having found out what this is at different ages and with different children, it is relatively simple for us to study the influence of other factors, such as posture, activity, and food ingestion, all of which increase the heat production and therefore the food needs. But first the minimum or basal requirements should be studied.

The importance of securing measurements under the same conditions cannot be overemphasized, for we cannot compare the food needs of an active, playing child with one who is sick, weak, and motionless. For comparative purposes, therefore, the children must be studied, first, in as nearly as possible complete muscular repose; second, since digestion increases the heat output, the children should be in the socalled postabsorptive condition, that is, with no food in the stomach, a condition found usually after about twelve hours' abstinence from food. Practically, this means making the measurements in the morning before breakfast. This last condition is very hard to obtain, as it is normal with children to have some food in the stomach.

TECHNIC EMPLOYED WITH INFANTS.

Now, to establish the minimum needs for food it is necessary to recognize that for every calorie given off by the child in the form of heat there must be a calorie in the food, or else obviously the child must draw upon his own body material and run behind. Thus, by measuring the calories given off under conditions of repose and without digestion, we know the minimum needs. To measure the actual calories given off from the living organism is a complex procedure, calling for an elaborate apparatus. It is relatively simple to collect the urine and stools, but one cannot easily collect calories. Body temperature does not help, as it represents only the temperature at a given time. The temperature of a room does not tell how much heat is lost through the walls or up the ventilating flues. There is an instrument, a calorimeter, a measurer of heat, that can be used. In spite of twentieth century instrumental perfection, it is important to note that this direct measurement of the heat production of children is so complicated that thus far hardly a half dozen children have had their heat production directly measured. These tests were made by Dr. John Howland in the laboratory of Professor Graham Lusk, of the department of physiology of the Cornell University Medical School in New York city.

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*The First Harrington Lecture delivered at the University of Buffalo Medical Department, Buffalo, N. Y., June 2, 1921.

Whenever heat is given off there is a process of combustion which involves the absorption of oxygen from the air and the production, for the most part, of carbon dioxide. Most of the oxygen absorbed is converted ultimately into carbon dioxide and a part to water. If, therefore, we can measure the carbon dioxide production, we can get a fairly close idea of the amount of oxygen absorbed, and likewise, what is still more important, a fairly close estimate of the amount of heat involved in the chemical reaction, heat which is finally lost in the body through radiation, conduction, convection, and vaporization of water. The problem of measuring the heat output of humans of any age resolves itself, therefore, into the measurement of the carbon dioxide production, or, preferably, the oxygen consumption. It has been established in a number of ways that each litre of oxygen absorbed results in the production of not far from five calories of heat. Consequently, to measure the oxygen consumption is the first step in the generalization of the study of the heat production of children.

The measurement of the oxygen consumption and the carbon dioxide production is by no means a simple step. It involves an air tight room or chamber. We used for infants a small, air tight box about the size of a crib, in which the infant is placed and through which pure air is passed. The carbon dioxide produced by the child is removed by the ventilating current of air, absorbed by proper absorbents, and ultimately weighed. In thus producing carbon dioxide, oxygen is withdrawn from the air current, and to keep up the supply of air pure oxygen must be added from a cylinder of compressed oxygen, through a carefully calibrated meter, and the amount thus added represents the amount actually consumed. By this means, therefore, we have a record of the carbon dioxide production and the oxygen consumption, and, indeed, in periods as short as half an hour or as much longer as desired. Usually the observations last but two or three hours; occasionally we have made experiments of twenty-four hours' duration, taking the infant out periodically for feeding.

It does not suffice to presume that the infant is quiet throughout all this period and that the measurements are made under complete muscular repose. We must actually control the activity and know to what extent the child is in complete repose or is more or less active. For this purpose, while superficial observation through the small window of the chamber may be employed, nevertheless it is better for the child to be, for the most part, in a relatively darkened chamber where observation of his movements is difficult. To eliminate entirely the errors of personal impression and the errors of ocular observation, we have a graphic method of registration, which makes it simple to secure perfect records of the degree of repose of each child. For this purpose the crib in which the infant sleeps rests at one end on two steel points or bearings. The other end is suspended by a stout spring, and parallel to it is placed a rubber tube pneumograph. As the child moves his hands or legs or head, he naturally shifts his centre of gravity so that the proportion of weight resting at one instant on the steel points varies continually, and more or less pressure is brought to bear on the spring at the head of the crib, and consequently the pneumograph is extended or compressed, depending upon the variations in weight. Inside the pneumograph is air. This air is carried through a rubber tube transmission out to a delicate rubber tambour and a writing point, which graphically traces on a smoked paper drum the relative activity of the child. When the child is perfectly quiet, a straight line is drawn; with each movement a deflection of the pointer occurs.

The significance of the pulse rate, when studied along with the graphic records of activity, is striking. By attaching a Bowles stethoscope to the chest of the infant and leading the tubes outside of the chamber to the ear pieces, the pulse can be counted continually and without disturbing the infant in any way. A large number of such pulse records have been made in each of our experiments, and hence it has been possible to compare the pulse rate with the activity at any given time, together, also, with the actual metabolism measurements. It is easily demonstrated that when the activity is high the pulse rate is high, and as the activity decreases and becomes less and less the pulse rate decreases until finally minimum pulse rate is coincident with minimum activity.

The actual conduct of an experiment is extraordinarily interesting, even to the long practised worker, and one of the best methods of recording such an event has been by means of a motion picture.[1] It should be borne in mind that, while the projection of such a film occupies but a relatively few minutes, it really represents the routine in an experimental period lasting from an hour and a half to two hours or more, and at times exactly the same routine has been carried on throughout twenty-four hours, when the infants have been removed from the chamber only from time to time for feeding. But however interesting the technic, the actual results are of permanent value and importance, and consequently we will examine some of the results actually found with an apparatus of this type.

ACTIVITY AND METABOLISM OF INFANTS.

Very early in the work it appeared that there was considerable difference in the metabolism of children when asleep, when awake, and when crying. Likewise there are differences between children of different weights and particularly children that are newly born. The accompanying table (Table I) gives certain typical data and makes it possible to compare the age, weight, pulse rate, gaseous metabolism, and heat production. The heat production, recorded in the last column of the table, furnishes perhaps the best data for comparing the metabolism under the different conditions. We note that the metabolism increases with activity, that is, the child awake has a slightly greater heat production than one asleep and when restless or crying has an even greater metabolism. What is true of the heat is likewise true of the carbon dioxide production and oxygen consumption, and, to a certain extent, the pulse rate. Of the two infants, E. N. and E. H. S., the one with the smaller body weight has a lower heat production. But special attention should be given to the last two infants, who were but five and three hours old, respectively. Thus, O. C. actually weighed a little more than E. H. S. and yet the heat production was less. This brings out the important fact that newborn infants have a very low heat production. The influence of crying upon the pulse rate and metabolism is pronounced in the case of E. N., the metabolism while crying being approximately thirty per cent. above that when the child was asleep. As a matter of fact, this particular experiment shows a rather minimum effect, since a large number of our children showed an increase in metabolism ranging from forty to two hundred per cent., the average being about sixty-five per cent. It can thus be seen what an important factor in the heat production of children is the element of crying. The mere fact that an infant can increase his metabolism two hundred per cent. by crying is of great interest, since for an adult man to produce this percentage increment above his minimum resting metabolism, it would be necessary for him to walk at the rate of three miles an hour.

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[1] The lectures were illustrated throughout with motion pictures.

TABLE I.

Comparison of Infants' Pulse Rate and Gaseous Exchange During Periods of Quiet and Muscular Activity.

	Weight Kilos	*Average pulse rate per minute*	*Carbon dioxide produced Grams per hour*	*Oxygen consumed Grams per hour*	*Heat produced Calories per hour*
Infant (E. N.) asleep...	5.41	114	4.81	4.40	14.7
Infant (E. N.) awake..	5.45	114	5.52	4.58	15.6
Infant (E. N.) crying...	5.38	136	6.74	5.63	19.3
Infant (E. H. S.) asleep.	3.15	103	3.20	2.54	8.8
Infant (E. H. S.) awake.		112	3.68	3.25	10.1
Infant (E. H. S.) restless.		119	4.38	3.30	12.0
Infant (O. C.) 5 hours old	3.64	111	2.11	1.98	6.6
Infant (U. H.) 3 hours old	4.08	103	2.42	2.04	7.0

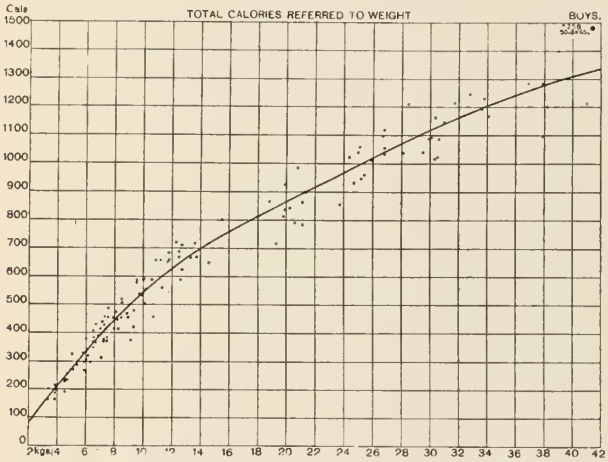

FIG. 1.—Basal heat production of boys in twenty-four hours referred to body weight.

RESPIRATION CHAMBER FOR LARGER CHILDREN.

This method of study, just described, made it possible for us to work with children from birth to about two years of age, at which age they began to exceed in size the comfortable confines of the respiration chamber, and an entirely new type of chamber was needed. All the children studied prior to two years of age were either from the Massachusetts General Hospital or the Boston Lying-In Hospital, or were the offspring of registered normal wet nurses, and hence presented unusually satisfactory normal material. The comparison of the results for these children with older children will be deferred until later. For the purpose of studying the basal metabolic needs of children two years old and above a respiration chamber large enough to take in a boy or girl twelve or thirteen years of age was employed. In this particular case the cover, instead of shutting down like the lid of a trunk, as with the infant apparatus, was suspended by pulleys and could be raised or lowered, the lower edge fitting into a water seal to make the apparatus air tight. In the top was a large plate glass window, making it possible for the child to look out or for the observer to watch the child. The usual provisions for graphic records of activity and for pulse counts were employed. The investigations were carried out at the New England Home for Little Wanderers and were continued for the better part of two years.

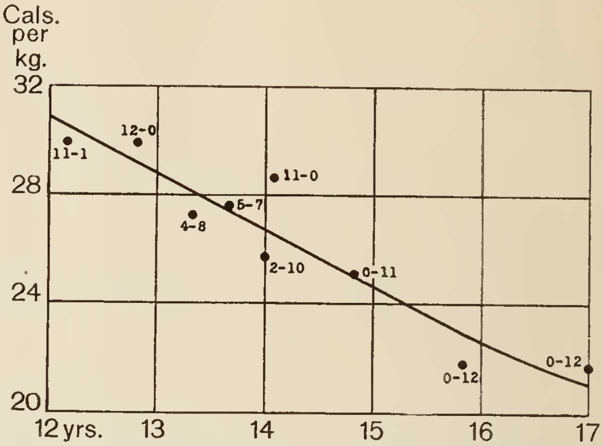

FIG. 2.—Basal heat production per kilogram of body weight in twenty-four hours referred to age, of girls twelve to seventeen years of age.

This technic is not at all onerous to the average child. In fact, we had no difficulty in securing any number of volunteers, and a large collection of metabolism measurements were therefore accumulated by us in a very satisfactory manner.

RESULTS OBTAINED WITH BOYS AND GIRLS.

Since these observations gave us data with regard to boys and girls of various ages and included measurements of pulse rate, carbon dioxide production, oxygen consumption, and the computed heat production, it was possible for us to make a large number of comparisons between these several factors. Only

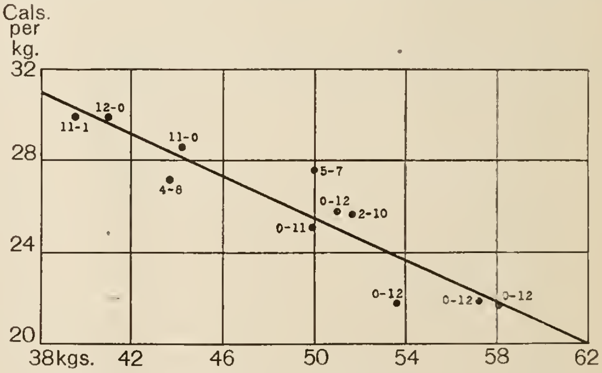

FIG. 3.—Basal heat production per kilogram of body weight in twenty-four hours referred to weight, of girls twelve to seventeen years of age.

a few can be touched upon here. We will first consider the experiments on boys, showing the total twenty-four hour caloric output compared to the weight. It must again be emphasized that this heat output is computed from the minimum basal measurements in relatively short periods and represents the actual minimum cost of maintenance. If the heat production in twenty-four hours of boys twelve years of age and younger is plotted on a chart against the weight (Fig. 1), it is seen that the individual points lie with rather remarkable uniformity fairly close to the smoothed curve indicating the general trend of metabolism. In other words, great deviations from the general trend were conspicuous by their absence. Obviously the heavier the boy the larger the total heat production, but as the weights increase, the increase in heat production does not proceed as rapidly as with the lighter weights, thus implying immediately a specific effect of the younger age upon metabolism. But so regular is the grouping of these points around the general smoothed curve that it is possible to predict the total heat production of boys from two to thirty-eight kilograms in weight from this curve. Similarly the accumulation of data on girls twelve years of age and younger showed great regularity in the grouping of points around a smoothed general curve, and this regularity makes it possible likewise to predict the heat production of girls of known weights. Table II incorporates the prediction values for both boys and girls.

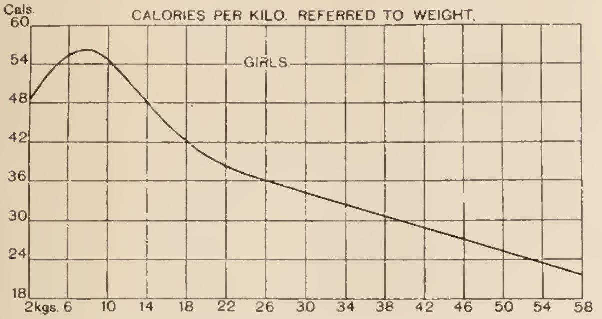

FIG. 4.—Basal heat production per kilogram of body weight in twenty-four hours referred to weight, of girls seventeen years of age and under.

TABLE II.

Basal heat production of boys and girls per twenty-four hours, predicted from body weight.

Weight without clothing Kilos.	*Boys Cals.*	*Girls Cals.*	*Weight without clothing Kilos.*	*Boys Cals.*	*Girls Cals.*	*Weight without clothing Kilos.*	*Boys Cals.*	*Girls Cals.*
3	150	150	15	725	690	27	1,045	975
4	210	220	16	755	710	28	1,070	1,000
5	270	285	17	780	735	29	1,090	1,020
6	330	350	18	805	760	30	1,115	1,045
7	390	405	19	830	780	31	1,140	1,070
8	445	460	20	860	805	32	1,160	1,090
9	495	500	21	885	830	33	1,180	
10	545	540	22	910	855	34	1,200	
11	590	580	23	940	880	35	1,220	
12	625	610	24	965	900	36	1,240	
13	660	640	25	990	930	37	1,255	
14	695	665	26	1,020	950	38	1,275	

Closer analysis of the original figures showed an entirely independent and very prominent age effect, with a clearly established, specifically high heat production at the earlier ages. Finally, as a result of recent research, it is possible to compute with great accuracy the skin or surface area of children of known weights and heights and refer the heat production in twenty-four hours to the actual surface area. No matter upon what basis of computation the heat production is made or whether it is referred to weight, age, or surface area, all the data point to a specifically high heat production of the youthful human organism.

GROUP METHOD OF STUDYING CHILDREN.

This series of experiments with children involved a great deal of time consuming labor. It was possible to make only one experiment a day and to be sure of each individual value it was deemed best to repeat the observation on another day, so that, working with the greatest degree of efficiency, it was impossible for us to study more than fifteen individual children a month. As time went on it seemed to be very important that, if possible, some method for studying groups of children should be devised. While, as has been seen from some of these curves, there is a rather wide scatter of the individual points about the smoothed curve, nevertheless in general there is a fairly uniform distribution. Accordingly, we have every reason to believe that good averages could be obtained by studying groups of individuals as well as by studying individually a large number of cases. This group idea and its accuracy was substantiated by the fact that when a group of twelve young men from the Springfield International Y. M. C. A. College and a duplicate group of twelve, drawn from the same student body, were studied in a large respiration chamber, identical results were secured. Into this large respiration chamber, which was devised for studying such groups, it was possible for us, therefore, to put groups of twelve individuals, selecting in so far as possible persons of the same age and preferably of the same general weight and height. Our first series of observations were carried out upon girls, for through the admirable organization of the Girl Scouts of America we were able to secure most wonderful cooperation, and the girl scout leaders relieved us entirely of the responsibility of collecting groups of normal girls. Indeed, it would be difficult to express adequately the great feeling of obligation that the Nutrition Laboratory has for the splendid cooperation shown not only by the girl scouts but by their leaders and by the whole organization.

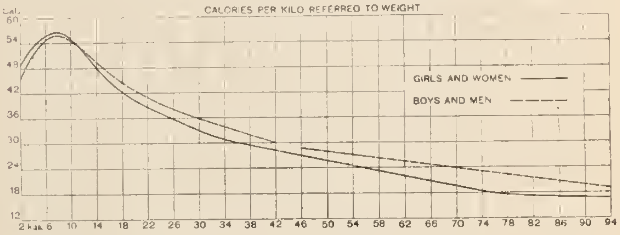

FIG. 5.—Comparison of the basal heat production of children and adults per kilogram of body weight per twenty-four hours referred to weight.

GIRL SCOUT EXPERIMENTS.

The general routine of the experiment was somewhat as follows. A group of normal young girls, averaging closely fourteen years of age, for example, came to the Nutrition Laboratory at a given evening at about 5 o'clock. The girls usually appeared in uniform with their scout leader. At 6 o'clock supper was served to the group, the scout leaders, and the experimenters. The evening was spent in entertainment, motion picture films were shown, and there was a talk with regard to the objects of the experiments. At about ten o'clock the girls prepared to go to bed inside the large respiration chamber. Much of the technic is of such a nature as to be of value only to experts and hence is left out of this presentation.

After entering the chamber the girls all went to bed and were supposed to become quiet as soon as possible and go to sleep. After they had gone to bed and had quieted down, the lights were put out, the curtains were pulled over the plate glass window, and the measurements began. The chief measurement was that of the carbon dioxide production of the girls in these groups. The method of determination had been most carefully checked by admitting and subsequently measuring known amounts of carbon dioxide in this chamber at different times, and indeed, by burning known amounts of alcohol, so we have every confidence with regard to the accuracy of the technic and can speak of the results with assurance.

Prior to the girl scout experiments a considerable amount of evidence had been secured with regard to the metabolism of children from birth to twelve years of age, and of adults from about eighteen years up to not far from thirty years of age. Between twelve and eighteen years of age with both boys and girls a gap existed. An examination of the data showed, however, what might be considered as more or less obvious, that in general as the weight of the person increases the greater the amount of heat produced, although at the higher weights this increase in weight and increase in heat is by no means strictly proportional. The gap between the age of puberty and about eighteen years of age was very noticeable, and the results for girls particularly did not conform so closely with those for women as did those for boys and men. To fill in this gap where irregularity is particularly prominent, namely, between young girls and women, the girl scout experiments were especially designed.

Examining now the data obtained with the girl scouts, we must consider, first, on what basis we can make comparisons. The girls were of different weights in the different groups, the groups ranging from twelve to seventeen years of age. As is to be expected, the younger girls would normally be the lighter weight girls. Even with these groups, however, there was not a perfect regularity in the relationship between age and weight. We must, therefore, employ the commonest method of equalizing for differences in weight by considering the heat production to the unit of weight, this unit being commonly taken as the kilogram. As with the younger children, comparisons can be made between age and heat production and weight and heat production, making the comparisons not only with the total heat production per twenty-four hours but likewise with the heat production per unit of body weight and per unit of surface area. When we chart the heat production per unit of weight, that is, per kilogram of body weight referred to age (Fig. 2), we note that with the younger and, it is to be emphasized, lighter weight girls there is a higher heat production per kilogram of body weight, thus speaking strongly for an age influence *per se*. Disregarding for the moment the question of age and charting the individual values found with the different groups of girl scouts on the basis of the heat production per kilogram of body weight referred to weight, we obtain the chart shown in Fig. 3, on which a smoothed curve has been drawn representing the general trend of metabolism. Here again the lighter the weight of the girls, the higher the heat production per unit of body weight. In these charts (Figs. 2 and 3) certain figures are noted opposite each point, the first figure indicating the number of girls in the group who had not reached maturity, i. e., who had not commenced to menstruate, the second figure representing the number who had. This was done with the idea of determining, if possible, any specific influence of the onset of puberty.

Now, since this important age range from puberty to the beginning of college age has been studied with girls to a greater extent than it has with boys, we can perhaps best compare the metabolism of girls of this age with younger girls and can examine the curve showing the general trend of the basal heat production per kilogram of body weight referred to weight for girls from birth to seventeen years of age. (See Fig. 4.) The striking points in this chart are that with the very young girls there is an increase in the metabolism until a weight of about eight or ten kilograms or about the age of one year; thereafter, there is a distinct decrease in the heat production per unit of weight, rather rapid at first, but slowly falling off after about thirty kilograms with a pretty regular decline. This is of special interest in indicating that during this early period of growth, when there are such rapid changes in the physical configuration, internal structure, and particularly the glandular organism, there are pronounced changes in the heat production per unit of weight. Certain physiologists prefer to consider the caloric output on another basis, namely, the square metre of body surface, but variations of exactly the same order, if not indeed somewhat greater, are observed when the calories to the square metre of body surface are compared with girls from birth to about seventeen years of age.

While the discussion thus far has pertained chiefly to results obtained with girls, since the girl scout experiments enable us to fill in the gap between puberty and the college age, essentially the same findings are recorded with experiments on boys.

CHILDREN AND ADULTS COMPARED.

Finally, it is of special interest to us to note how these observations on children and youths compare with adults. This can perhaps best be noted by the chart given in Fig. 5, which shows the heat production per kilogram of body weight referred to weight for males and females from birth to old age. The curves showing the heat production per kilogram of body weight and per unit of surface area, comparing children and adults, bring out very strikingly the fact that there is a greater intensity of heat production during youth. This in part explains the well known enormous demands for food by active, growing children. Even if they indulge in no activity whatsoever (and it must be remembered that all of these observations have been made during as nearly as possible complete muscular repose), we still have with children under such a condition a specifically high, intense metabolism and great need for energy.

VALUE OF BASAL METABOLISM MEASUREMENTS WITH CHILDREN.

The question might properly be raised, What value have these measurements, when we never find children under these conditions? The normal child is never perfectly still and quiet during the day, without food in the stomach. He usually has been eating and is not infrequently active. These measurements have, however, a significance that must not be lost sight of, since they represent the basal requirement, the irreducible minimum, without which life cannot continue. Furthermore, these measurements were made under conditions which approximate rather closely from eight to ten hours of the life of every boy and girl, namely, after they have gone to bed and are asleep. As soon as they wake up, there is immediately a superimposed effect of activity and there is a superimposed effect of digestion. The influence of this latter factor can be rather easily determined and, indeed, not a little evidence is already available with regard to it. It is more difficult to measure the influence of activity, but the heat production during the schoolroom hours was determined with great accuracy more than twenty-five years ago by the Scandinavian investigators, Tigerstedt and Sondén. It is not too much to hope that before long the effect of the different activities entering into a child's life may be so studied as to enable us to compute with considerable accuracy the total caloric output, which, however, must in all cases be based fundamentally upon the irreducible minimum or basal metabolism, which these observations were primarily designed to furnish.

Perhaps no more tragic illustration of the value of measurements such as these will ever be brought to our attention than the situation existing even today in Vienna, where children are fed on the very narrowest margin. Every available calorie in the food supply of the American Relief Commission must be distributed with the greatest care, to be sure, in the first place, that no children receive excess calories that are needed by others, and secondly, that as many as possible of the woefully undernourished children should have the benefit of an equal distribution of the available food supply. Liberal estimates as to food needs cannot obtain here. A knowledge of the irreducible minimum is of vital importance in the intelligent distribution of the limited food supply.

Such rationing conditions are certainly by no means ideal for the life and welfare of children. Undernourishment, with its accompaniment of lowered vitality and lessened desire for activity, is unphysiological. The active, growing boy or girl needs practically all the energy intake that can possibly be eaten. The wholly remarkable study of Dr. Gephart of the energy in the food eaten by a group of unusually healthy, normal, school boys at St. Paul's School, Concord, N. H., brought forth the astonishing fact that the average food consumption approximated more nearly five thousand calories than the one thousand two hundred to one thousand four hundred calories shown in our basal metabolism curves. Children must have large amounts of food. They need food for maintenance, and we have seen that there is a specifically high demand for maintenance; secondly, they need it for the normally large physical activity, and third, food is indispensable to proper growth. It can be seen, therefore, that, other things being equal, children must have large food intakes. Indeed, it may be safely asserted that if digestive disturbances are avoided, it is impossible to overfeed the growing child with good, simple, nourishing food.

Vila Street.

A Further Clinical Report Upon Poliomyelitis with Cortical Involvement*

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Specific instances of cortical involvement in poliomyelitis are still rare in clinical reports. In 1912 I reviewed rather extensively the scant literature upon the subject and reported two cases of organic epilepsy apparently caused by the secondary or residual lesion of poliomyelitis. In both cases there was enduring neuromuscular evidence of the precedent spinal palsy with a clear history of its actual crisis. Since that time of report but little has been presented to show that cortical involvement in any large or extensive material is even more clearly proved than before.

In order to prove a cortical or meningeal involvement in poliomyelitis one needs to exclude the other forms of meningitis, not alone cerebrospinal but also the tuberculous types (1). One may summarize the cerebral involvement in poliomyelitis on its anatomicopathological side as follows:

There may be a disseminated encephalitis affecting not only the white substance of the pons and crura cerebri, but also the gray matter of the cortex and regions of the central ganglia. The process, in some instances, would seem to originate in the pia, thus furnishing an important argument for the fact that in the epidemic disease the palsy or injury may be a cerebral instead of a spinal one. The random and often unilateral character of the lesion in the cortex is a parallel picture to the pure spinal types. The rarity of the cerebral type is accounted for by Wickman on the ground that epidemic poliomyelitis is an ascending disease and therefore must tend to involve the bulb before it reaches the brain. However, it must be said that in experimentally induced poliomyelitis in apes, no encephalitis can be induced, thus seeming to contradict this theory of extension of the virus up the cord by means of the lymph spaces. It is, however, impossible to inoculate the ape's cortex or subdural spaces directly. We are, therefore, forced to conclude that the lumbosacral cord is most predisposed and the cortex least so. As before mentioned, a simple spastic state cannot necessarily be ascribed to a cerebral, or at least, a cortical involvement, as not infrequently the bulb shows such extreme involvement that the pyramidal tract at this juncture is often seriously damaged.

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* Read before the Section in Neurology and Psychiatry, New York Academy of Medicine, December 13, 1921.

Müller has seen four cases of spastic paralysis, none of which could be explained by a polioencephalitis of the cortex solely. In one of his cases, the patient a child aged seventeen months, a spastic hemiparesis suddenly developed after a febrile attack. This was explained by a lesion of the pyramidal tracts within the pons as shown by the crossed peripheral facial palsy. In another case there was a spastic state in one lower extremity and a flaccid palsy in the other. In still a third, there was a hypotonic paresis of the leg and a hypertonic paresis of the arm. There can be little doubt that in the majority of cases with spastic palsies the lesions inducing the same are at the bulbospinal level rather than cortical. A few cases, however, are on record, as reported by Müller and Förster, in which a disseminated encephalitis must have been the predominant lesion. I am not aware, however, that any one has reported an exclusive encephalitic lesion in a case of undoubted clinical polioencephalitis. In other words, the clinical and pathological reports have not yet coincided in the one case. If the spastic state is, therefore, not a criterion of cortical involvement and can only be considered presumptive evidence, what other facts must we include to make the lesion definitely a clinical as well as a pathological fact? Obviously, the presence of chorea or athetotic movement cannot be a part of the positive criteria, as lesions giving rise to these symptoms may be, and indeed are, most frequently subcortical in origin. True motor asphasia, enduring mental enfeeblement, such as idiocy and genuine grand mal epilepsy, would seem to make the diagnosis of cortical involvement positive. Of all these phenomena genuine and enduring epilepsy might be definitely considered to make the diagnosis of a cortical lesion most certain.

My first case previously reported (2) was that of a youth of eighteen who had a typical attack of poliomyelitis at fourteen years of age which involved both legs, the right most. He used crutches for six months. His enduring epileptic attacks appeared promptly, within a week or two after the poliomyelitis. The seizures were grand mal and of monthly occurrence. He had a steppage gait, a moderate palsy, and atrophy in the tibials and peronei. The knee jerks were barely obtainable on the right. For full details one may consult my original report. In the second case, which occurred in my service while an intern at Craig Colony, the patient was a man of thirty-eight, who suffered from a mild attack of poliomyelitis when eight years old which affected the whole right extremity. There was a wasting of the whole right leg from the hips downward and some shortening resulted. Slight talipes equinovarus and contractures in tibialis posticus of this same side was in evidence. Left knee jerk was nearly absent, while the right appeared nearly normal. Achilles jerk was active on the left side and absent on the right. There was a normal big toe reflex. Reaction of degeneration was present in tibials and peronei. There was a neurotic family history and alcoholism in the father. The patient's first seizure occurred at eighteen; his attacks were grand mal, preceded by no aura and were mostly nocturnal. At first they occurred every two or three months. At the time of my report they were of weekly onset, and considerable mental deterioration was present.

Stern has published a study (3) upon the future of poliomyelitic children, and has found two cases of epilepsy developing several years after the initial disease. His material embraces one hundred and seven cases of poliomyelitis. This author suggests that so long an interval took place between the poliomyelitis and the subsequent epilepsy suspicion is justified that the affections were coincidental. No data whatever are added. The cases are identical with my case just cited, in which epilepsy was sequent to poliomyelitis contracted in infancy and in which the comitial disease appeared ten years after the onset of the acute poliomyelitis.

My third case is a still more interesting one, as the degree of poliomyelitic involvement, while intense at the beginning, has left no paralytic phenomena. It may therefore be questioned whether the palsy was strictly a poliomyelitis or not. The boy is now sixteen years old. He had none of the usual diseases of childhood except whooping cough. At the age of three years, after a slight indisposition lasting several hours, the boy was placed in bed and slept quietly all night. When taken up in the morning and placed upon his feet he could not stand and collapsed on the floor. The temperature then was taken and found subnormal. He was fully prostrated in all extremities but the legs were the only ones in which the initial collapse continued. For three weeks this state existed; the left leg and ankle were most affected. He was given the usual treatment of massage and electricity. Knee jerks were absent and there was reaction of degeneration. In six weeks he seemed to recover fully. Five months later he had his first grand mal attack of epilepsy. A second similar attack occurred an hour or so after the first. The epileptoid state did not recur until a year later. The next few years following this free interval the convulsive disorder grew worse. He is now a confirmed epileptic with rather regular attacks every two or three weeks under sedative medication (two grains of luminal daily). Present physical examination shows no evidence functionally or electrically of the former infantile palsy.

REMARKS.

In the first and third cases the patients were very similar in nervous makeup. They were both bright, sensitive, overactive types of boys, continually interested in sports and games, but only wanted to engage in them according to their own desires. In short, they possessed a mild type of epileptic makeup and probably the inception and continuance of the epilepsy was not a little conditioned upon this personality makeup. In my second case the patient was a classical epileptic in temperament and mental attitudes. In all three, therefore, one might say that lacking the predisposition they might not have had their epilepsy or it would not have continued, as it has in all three, if the predisposition to the disorder had not been present. Just what the meningeal or cortical lesion coincident with the poliomyelitis may have been, cannot even be surmised, inasmuch as the type of convulsive attacks are not dissimilar to that seen in the essential disorder. In an experience of many years and an analysis of thousands of epileptics the cases cited above are all the instance of poliomyelitis followed by enduring epilepsy that I have encountered. The subject, therefore, seemed worthy of clinical report as a contribution to cerebral involvement in poliomyelitis. With the exception of Case II, no other instances of poliomyelitis among epileptics have been noted at Craig Colony in an admission of several thousand cases.

REFERENCES.

1. KOPLIK: Cerebral Forms of Poliomyelitis and Their Diagnosis from Forms of Meningitis, *American Journal of the Medical Sciences,* June, 1911, No. 471, p. 788.

2. CLARK: A Clinical Contribution to Our Knowledge of Poliomyelitis with Cortical Involvement, *Ibid,* April, 1921.

3. STERN: *Jahrbuch für Psychiatrie,* etc., 1911, No. 182.

2 EAST SIXTY-FIFTH STREET.

The Connection Between the Short Thick Neck and the Tendency to Apoplexy

With a Note on the Relation of the Brachial and Cerebral Blood Pressures

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Although it has for centuries been realized that a short thick neck is frequently encountered in patients with a tendency to apoplexy, as far as I know no one has attempted definitely to classify these two into cause and effect, much less to offer a scientific explanation of the connection between the two. All that can be said is that the general verdict appears to be in favor of regarding the short thick neck as one of the primary causes of apoplexy; one seldom hears the reverse view expressed.

Now, although it can quite well be admitted that a short thick neck and a tendency to apoplexy, when once established, can react on one another in a vicious circle (more of this will be said below), I consider that it is quite wrong to regard either in the light of a cause of the other. In my opinion in almost every case both are merely the later local manifestations of one common cause, namely, persistent contraction of the cervical muscles.

This muscular contraction comes on very slowly, often taking years, and thus is not noticed by the patient himself or his medical adviser because there is no reason for the latter suspecting it. It is chiefly due to two causes: 1. The cervical muscles in ordinary life are but seldom called upon to act against resistance as are the muscles of the trunk and extremities, and they accordingly readily become weakened and their powers of resistance diminished (1). 2. These muscles may thus become the receiving ground for toxins, especially alimentary, but also specific and rheumatic, that are circulating in the blood. Once set up, the muscular contraction and toxemia easily react on one another and thus a vicious circle is established.

The ultimate result of this contraction is that a dorsocervical lordosis gradually supervenes. This arises through an increase both in the amount of extension in the cervical and of flexion in the upper dorsal vertebræ. Usually in addition there is some degree of persistent elevation of the shoulders from contraction in the trapezii. The head is somewhat protruded but maintained in its original position by the action of the upper cervical muscles, including the sternomastoids, which act so as to prevent the upper posterior cervical muscles from overextending the occiput on the atlas. This dorsocervical lordosis is a permanent reproduction of the temporary (almost involuntary) act commonly known as "drawing one's head into one's neck," which ensues when a subject is afraid something is going to fall on his head, or when he suddenly finds that there is danger of his hitting his head when passing under a low door or archway. In this manner, aided by a deposit of adipose tissue, generally as the result of too little exercise, is evolved the short thick neck.

The results of the above mentioned contractions and lordosis on the vessels and nerves of the neck are as follows:

1. Persistent irritation of the cervical nerves that lie in or adjacent to the contracted muscles; this is readily increased by toxins that may have settled in the latter and is quite possibly augmented by reflex impulses from the cervical joints which are continually being compressed.

2. Chronic venous congestion in the neck: a. In the internal jugular veins because they are compressed between the sternomastoids and the projecting lordotic cervical vertebræ. The result is on a

small scale what happens normally during movements that entail any prolonged extension of the cervical vertebræ, such as gazing upwards. b. In the vertebral veins. In many skiagrams (Figs. 1 and 2) of the apoplectic neck the atlas and occiput can often be seen in too great approximation; this is without doubt due to the increased suboccipital contraction. By this means the atlantooccipital area is much reduced in size and this may easily cause persistent compression and stasis in the veins mentioned. c. In all the veins that lie in or between any of the contracted muscles and are thereby being subjected to continued increased pressure. Clinically I have often seen a temporary marked diminution in the purple coloring of an apoplectic face result from performing elongation of the neck by lifting the head upwards as in Fig. 3. This is presumably induced by the stretching relieving the pressure on the veins of the neck.

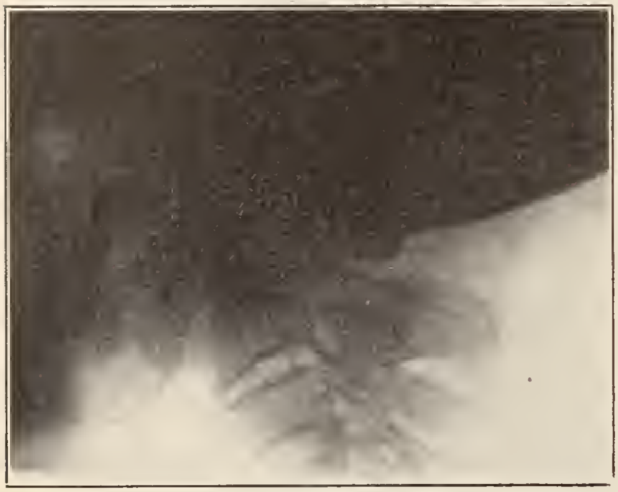

FIG. 1.—X ray photograph showing close proximity of atlas and occiput, with corresponding reduction in atlantooccipital space.

3. Irritation of the vagus nerves may arise from compression in the same way as with the internal jugular vein, though the precise rôle played by such irritation is difficult to determine with accuracy (2).

4. Irritation of the cervical sympathetic, which as is well known contains vasoconstrictor (possibly also vasodilator) nerves of the head and accelerators of the heart, may also be induced in the same way as in the case of the internal jugular vein, and may also play some part.

The extent of both vagal and sympathetic involvement are probably in great measure dependent upon the amount of movements of the neck in which the patient indulges, varying in direct proportion.

Now I have had it suggested to me that the comparatively small amount of cervical lordosis under consideration would be insufficient to produce any appreciable vagal or sympathetic effect. This statement is of course difficult to refute, but a certain amount of evidence in favor of its being sufficient is not wanting. For example, Lowman (3) has traced a distinct connection between faulty skeletal alignment and various eye conditions, through the former involving the cervical sympathetic. Evans (4) has reported a case in which (as measured by me) (5) a dislocation of the neck consisting in malrotation of the seventh cervical vertebra through 3° 3′ and of the sixth through 1° 38′ was sufficient to cause permanent paralysis of the cervical sympathetic; now this amount of unilateral projection from the dislocation is not much in excess of what might be induced by a lordosis in the same site. The fact that a small amount of lumbar lordosis can cause albuminuria, if anything, supports the theory that cervical lordosis might involve the nerves mentioned.

The result of all the foregoing on the circulation may be varied: a large number of vasomotor changes may ensue, their exact nature and extent depending upon which set of nerves are stimulated, and in the case of more than one set, which gains the permanent supremacy. Thus to quote some examples:

1. If both upper and lower cervical nerves are stimulated together, in my opinion the most usual occurrence, a general rise of blood pressure takes place in the whole of the body (6). Thus the brachial and cerebral pressures will coincide.

2. If the lower cervical nerves are stimulated most, the result may be a general rise of blood pressure everywhere except in the head with or without the neck. This will be similar to the result obtained in anemia of the head by administering nerve frictions according to the method of the late H. Kellgren to the nerves in question, or applying a cold key to the nape of the neck, and closely resembles the effect that strychnine may produce, i. e., general vasoconstriction except in the vessels of the central nervous system. Thus the brachial pressure will become greater than the cerebral.

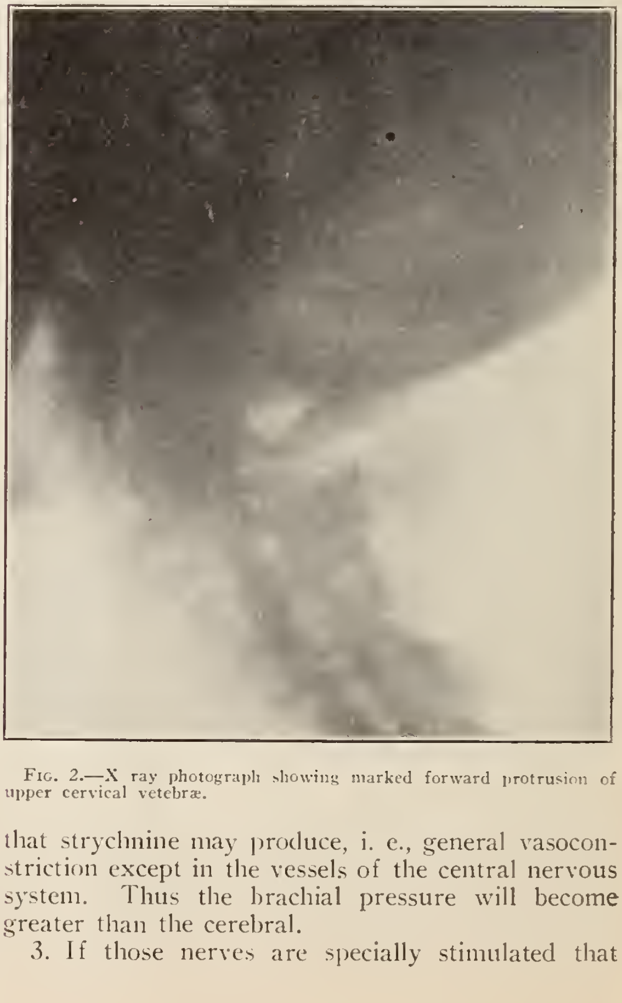

FIG. 2.—X ray photograph showing marked forward protrusion of upper cervical vetebræ.

3. If those nerves are specially stimulated that

originate Bayliss's antidromic impulses, an active vasodilatation of the arms may ensue. Thus the brachial pressure will be lower than the cerebral.

The fact that arteriosclerosis has commenced may also complicate matters; pathologists have long ago shown that this disease can advance to a much greater extent in one part of the body than in another. As a rule it may, I consider, be assumed *ceteribus paribus,* that arteriosclerosis develops more rapidly in vasoconstricted, irritated and weakened areas than in normal ones. Thus, in the three examples given above, the blood pressure will tend to be increased still further in the already elevated areas in consequence of the arterial degeneration and will thus increase the already existing differences.

Under normal conditions the blood pressure in the brachial artery is a perfectly reliable index to that of the cerebral. For some reason or other this has also been considered to be true of pathological conditions. Until recently no corroboration or refutation of this supposition was possible because there was, and is, no possible method of estimating the cerebral blood pressure in the human subject. Recent investigations, however, have brought to light one fact which definitely proves that in a large number of pathological states the brachial pressure cannot be the same as the cerebral. That is to say, it has been established that in unilateral conditions, whether in arm, trunk, leg or head, whether from disease or trauma (and even in some middle line or bilaterally equal conditions) the blood pressure in the two arms varies considerably (7). Thus differences in the maximum pressures of ten per cent. and over are found in about eighty-three per cent. and of twenty per cent. and over in about twelve per cent. of all such cases, the figures for the minimum being respectively eighty-one per cent. and twenty per cent. Now obviously the cerebral pressure cannot simultaneously correspond to different values.

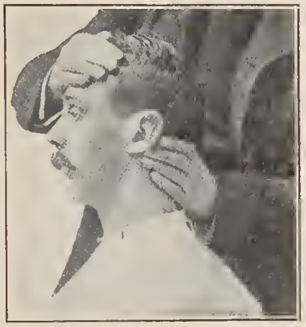

Fig. 3.—Performing elongation of neck by lifting head upward.

The possibility of there being considerable differences between the brachial and cerebral blood pressures may sometimes account for two sets of cases which are somewhat puzzling, namely, 1, those in which a cerebral hemorrhage occurs with a practically normal brachial blood pressure, and, 2, those in which no hemorrhage occurs in spite of greatly augmented brachial blood pressure. As an example of the latter I may quote a case in which during two years there had been a pressure varying between 260 and 280, but so far nothing cerebral has resulted. The first set could be accounted for by presuming that there was marked arteriosclerosis in the head but none or a very small amount elsewhere, and the second set by presuming the reverse.

The two skiagrams that I append herewith show the close proximity of the atlas and occiput with corresponding reduction in the atlantooccipital space; in Fig. 2 the forward protrusion of the upper cervical vertebræ is quite marked. Both the skiagrams were kindly taken for me by Dr. S. Melville from patients with short thick necks and high blood pressures.

REFERENCES.

1. Cyriax, Edgar F.: *Medical Press and Circular,* 1920, new series, cix, 461-463.
2. Abrams, Albert: *Spondylotherapy,* 1912, pp. 228, 321, 325; *Philadelphia Medical Journal,* 1900, vi, 601-603. (According to Abrams, extension of the neck produces vagal stimulation.) Erben: *Deutsch. Zeit. f. Chir.,* 1921, lxviii, 233.
3. Lowman: *American Journal of Orthopedic Surgery,* 1918, xvi, 459-492.
4. Evans: *Birmingham Medical Journal,* 1916, lxxx, 7-10.
5. Cyriax, Edgar F.: *Journal de Chirurgie,* 1919, xv, 467.
6. *Idem: Practitioner,* 1917, xcix, 468-473.
7. *Idem: Quarterly Journal of Medicine,* 1920, xiii, 148-164; 1921, xiv, 309-313. Cyriax, R. J.: *British Journal of Tuberculosis,* 1919, xiii, 73-77.

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Autotherapy

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Autotherapy has been selected as a title rather than autoserum therapy, for the reason that the toxic substances produced in the patient's own body as a result of the action of infections are used as the basis of treatment solutions, rather than serums and vaccines made from identical or similar strains of bacteria and held in suspension in horse serum or saline solutions.

The toxic substances are obtained from sputum, nasal, aural or other discharges, and then incubated at room temperature in double distilled water. This pathogenic exudate or other body fluid containing the unmodified toxic substances is filtered and prepared in double distilled water for subcutaneous or intravenous use according to the methods devised by Dr. Charles H. Duncan, of New York (1).

Such diseases as are amenable to cure by autotherapy respond to the treatment due to the entrance by injection under the skin of the properly prepared unmodified toxic substances, and when this occurs the power of the patient's own blood serum is raised, the activity of the leucocytes greatly stimulated and, as a result, the specific antibodies needed to start this natural cure are developed in the blood.

This really means that by this method of treatment we start an autoimmunization exactly as Nature immunizes human beings to subsequent attacks of disease. For, by the method designated autotherapy by

Dr. Duncan, "the patient is immunized with, and therefore to, the unmodified toxic substances elaborated within his own body, by the action of the infectious agent (symptom producing agent) on his body tissues."

This is the way Nature works a spontaneous cure. The cure as worked by the physician is to obtain the bacteria free filtrate, which contains all of the unmodified toxic substances from all of the microorganisms that are in the focus of infection. Furthermore, these bacterial toxins are in the same proportion and virulence in which they appear in the patient's body, and when the standardized dilution of this filtrate or treatment solution is injected subcutaneously into another part of the patient's body the resistance of this comparatively healthy tissue to all toxins and toxic substances leads to a development of the antibodies exactly suited to annul the diseased process elsewhere in the body.

Waag, Carnot and Poppenheim (2) report surprisingly good results from the repeated small doses of the patient's own blood injected subcutaneously in pernicious anemia. Waag gives the following details of a man who at the beginning of treatment had only a twenty-five per cent. hemoglobin content of blood; red blood corpuscle count 285,000, and a color index less than one. After the usual treatment and arsenical preparations had failed, he injected into the thigh of the patient five c. c. of whole blood taken from the patient's arm. A like injection was given the next day. A marked improvement followed; hemoglobin had now risen to thirty per cent., red blood corpuscle count to 1,500,000. Treatments twice a week were given for another month; patient gained thirteen pounds, hemoglobin was sixty-five per cent., and red blood cells 2,500,000. Temperature was normal. Urine was free from albumin, sugar and urobilin. Only slight smarting accompanied the injections, which was at once relieved by hot compresses after which an ichthyol bandage was applied.

Instead of using the whole blood, Strossberg in treating pellagra allowed the freshly drawn blood to incubate at room temperature for four hours, the clotted blood removed from the sides of the tube with a flamed platinum needle, and the blood put into the ice box over night. The next morning the separated serum was injected intragluteally and a small portion subcutaneously. Three to six treatments, four days apart, were given. In eight of sixteen cases all skin and subjective symptoms disappeared in from eight to twenty-six days; four patients ran to thirty-six days before the full improvement in the dermatitis, heart burn, dizziness, and headache was manifest. Two patients showed but little improvement.

These references could be considerably extended, but to no purpose other than to accumulate evidence as to the promptness of result and therefore the desirability of giving the patient the advantage of the improved methods in blood treatments.

Brodin (3) has called attention to a method of preparing the blood for intravenous use so as to avoid the disturbance, sometimes observed with serotherapy, by diluting the serum with nine times its volume of eight in a thousand sodium chloride solution. This practice is based on the discovery that the pronounced anaphylaxis, otherwise inevitable in a dog sensitized by a previous injection of horse serum, could be entirely prevented when a second injection of the serum was made by diluting the serum for the second injection with nine times its volume of eight in a thousand sodium chloride solution.

Another and an effective method is to take one c. c. of the patient's blood and dilute it with nine c. c. of double distilled water. Incubate for twenty-four hours and then make the strength solution needed for treatment by diluting in one tenth, one one hundredth, etc., normal saline solution. If the treatment is to be given intravenously, then to avoid anaphylaxis the dilution should be up to nine or more times the volume of the original incubated product.

The field for the use of autotherapy is considerably extended by the use of the patient's own bodily secretions other than his own blood. For instance, in a case of erysipelas seen recently in consultation, because the lids of one eye were badly swollen and the swelling extended over the nose to the other eye, the serum was obtained from the blisters on the face and head from which the filtrate was made. One injection subcutaneously in the arm stopped the progress, and a second injection the next day caused a perceptible retrograde process to begin. Treatments every four days for two weeks cleared up the condition. In suppurative disease of the ear, nose and throat the secretions from these parts serve as the basis for securing the treatment material for solution, filtration, and proper dilution for injection.

We may refer to a case of ethmoiditis, in which there had been two intranasal operations and curettements to secure better drainage from the sinuses, but the discharge was just as profuse and no less offensive. The discharge was obtained early one morning, before eating, to avoid foreign protein material. Ten injections given during a period of two months cleared up the sinusitis. Some weeks later the patient caught cold and had what he called a relapse. The same filtrate was still on hand, having been made up with glycerine and tricresol, and two treatments cleared up the condition again, more promptly and more satisfactorily according to both of us than anything heretofore used.

The cure of a chronic subglottic laryngitis in a minister within a month will appeal to all who have had to treat such aggravated cases of hoarseness and loss of voice. In this case a liberal use of potassium iodide had been made, fifteen grains three times daily, together with local treatment, without result.

The patient's personal history was negative, Wassermann and sputum tests were negative. The filtrate was made from the early morning sputum and injections of a one in a thousand solution were made every four days. At the end of the seventh treatment the patient could "run the scale and use his voice naturally." He was instructed to speak in monosyllables for a month or six weeks, and then to take some lessons in the proper use of the voice. We know in these cases of diffuse laryngitis that the prognosis is grave and that the hoarseness often remains permanent, even though the swellings subside.

Arthritis with its painful joints, stiff muscles, and aching in various parts of the body, yields to this treatment better than to any other in my experience. In these cases the blood is the basis for preparing the curative solution for intravenous use. Briefly, a small amount of blood is taken from a vein, one c. c. will do. It is diluted with nine c. c. of double distilled water and incubated twenty-four hours. A high dilution is made of a strength of one in a million to one in a billion in double distilled water, the last dilution being made up in sterile normal saline solution. This is given intravenously. The treatments may have to be given up to the number of ten or more, blood being taken the day before each treatment. This entails considerable detailed work and sterilizations, which are drudgery unless one is properly equipped and has trained assistants at command.

Vitón and Poncet use dilutions of from one in a hundred million up to a figure with fifteen zeros for tolerant patients with tuberculosis, subacute and chronic rheumatism, neuralgias, lumbago, dorsal myalgias, and disordered heart action. In sensitive patients exhibiting glandular troubles, paratuberculosis, dyspepsia, exophthalmic goitre, hyperthyroidism, ovarian neuralgia, diabetes, neuritis, and lesions of the eye, in this group they use solutions of a strength of one to fifteen and twenty zeros.

Vitón and Poncet use tuberculin in minute doses for some stages of the foregoing mentioned diseases, because statistics show that nearly every one is tuberculous to a slight degree, and with these minute doses patients are greatly benefited and not damaged at the outset, as is the case with ordinary tuberculin treatment. Jules Goldschmidt, of Paris, says (4): "We know that the blood is the receptacle of all the products that are created by healthy life or disease. We know of no other liquid in the whole organic world so rich in the most heterogeneous chemical substances as blood. Certain important substances circulate in it, which we only assume are there, not having been able to isolate them, but with which we work when we elaborate preventive or curative serums."

The blood is a perfect antigen (antibody producer or antidotal agent) and when properly prepared the patient's own blood will cause the liberation of the specific antibodies to antagonize the diseased influence in the patient. This is the underlying principle in spontaneous cures and is the factor by which Nature confers for a lifetime an efficient immunity against renewal or, exceptionally, an increased susceptibility (anaphylaxis) to the same or similar diseases.

REFERENCES.

1. Duncan, Charles H.: *Autotherapy*, New York.
2. Waag: *Münchener medizinische Wochenschrift*, June 3, 1921.
3. Brodin: *Presse médicale*, November, 1920.
4. Goldschmidt, Jules: *Medical Review of Reviews*, April, 1921.

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Acute Phlegmonous Epiglottitis with Report of Cases

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The epiglottis, situated as it is in a most vulnerable locality, is easily exposed to infection, not alone from the usual sources to which the entire oropharynx and laryngopharynx are subjected, but because of its proximity and intimate relationship to the larynx, the esophagus, and the base of the tongue, it is brought into sympathetic inflammation in conditions affecting these structures. Secondly, the epiglottis is involved in both the acute and chronic affections, the process of inflammation proceeding as a result of extension from the surrounding structures. The epiglottis frequently shares in acute inflammations of the tonsils, both faucial and lingual, in acute pharyngitis and in Ludwig's angina. In the more slowly progressing maladies, referring particularly to tuberculosis and carcinoma, the epiglottis becomes secondarily implicated, the process of destruction being directly due to the character of these diseases; the encroachment upon the epiglottis resulting from its proximity to these adjoining structures in which the process originates.

Unusual as it may seem, the epiglottis may be affected singly, but so far as its being the primary focus of infection in inflammations of a more or less extensive nature involving the oropharynx or the laryngopharynx, this is questionable. Acute primary phlegmonous inflammation of the epiglottis is considered a rather rare occurrence. That the condition does occur as a distinct entity was first pointed out by Michel in 1878. He described the condition as being due to an inflammation confined to the anterior surface of the epiglottis, but sometimes affecting the larynx to a slight extent. Other observers, notably Thiesen (1) and Lederman (2), investigated and studied the condition. They reported a series of cases practically analogous in regard to the etiology, pathology and course of the disease, thus corroborating and confirming the views expressed by Michel in his original description.

The condition is distinctly epiglottitic in origin, not being preceded by any inflammation in the adjoining tissues. The attending edema which characterizes the affection is limited to the anterior or lingual surface because of the anatomical conformation of the epiglottis. As was pointed out by Hajek, the submucosa of the anterior surface is abundant and the mucosa not tightly adherent, while on the laryngeal surface the mucous membrane is tightly adherent to the cartilage, thus permitting little or no infiltration in the latter locality. Furthermore, the pharyngoepiglottic ligament acts as an effectual barrier separating posteriorly the cellular tissue of the epiglottis from that of the sinus piriformis and aryepiglottic folds, so preventing extension of the edema to these structures in most instances. Nevertheless, the process, especially the suppurative variety, may find its way to the laryngeal surface.

The inflammatory changes consist chiefly of a localized edema of varying degree, which may subside spontaneously or be hastened after free scarification, without evidences of pus formation. On the other hand, the condition may progress beyond this stage and signs of suppuration may become manifest with veritable abscesses, one or more in number. In two of our cases the former course was followed, while in the other two, after incision into the suppurative mass, laudable pus was obtained.

As was pointed out by Theisen (3), there is no question that the affection is purely infectious. Even in those instances where suppuration does not follow, smears and cultures made from the extravasated serum following deep scarification demonstrated the presence of a mixed infection (staphylococcus and pneumococcus, and streptococcus and pneumococcus). According to Welch, the constant presence of the pneumococcus of the edematogenic variety (Diplococcus lanceolatus) is the causative factor in the production of edema in these cases. He found that injection of this organism into the subcutaneous tissues of some of the lower animals uniformly produced extensive local edema.

The etiology in acute phlegmonous epiglottitis is often obscure, the attack is frequently ushered in suddenly, no prodromal symptoms of any particular nature being discernible. It is this feature which characterizes the condition. In the majority of cases there is no history of any previous inflammation of the pharynx or larynx, although Kyle (4) expresses the view that the condition is never present unless there is an associated and preceding laryngitis. However, whether this is true or not, in our cases we could not ascertain any such history. The question of injury to the epiglottis during ingestion of certain foods is an aspect that might justly be considered. In one of our cases the patient gave a history of having swallowed a fishbone and from the time of this incident her symptoms developed. Whether this was merely coincidental, we are not prepared to say. Nevertheless, it is not stretching one's imagination beyond reason to consider this as a possible etiological factor.

There may be a history of mild throat symptoms before the onset of the more severe manifestations, such as fullness in the throat, or a tickling sensation precipitating coughing, but these originate from direct involvement of the epiglottis in the early stages of inflammation. In most instances the person is in perfect health. He suddenly experiences severe pain in the throat associated with painful deglutition and a sense of fullness or obstruction in this region. The patient cannot swallow without discomfort. The voice becomes distinctly guttural and in a short time a sense of oppression supervenes and the patient is in a most distressed condition. There is usually an associated pyrexia. On other occasions there is an initial chill followed by a rise in temperature. The patient complains of headache and nausea, with general malaise.

In another group of cases the first symptoms are those referable to the region of the epiglottis. These patients complain of the presence of a foreign body in the throat which cannot be dislodged. The mass seems to increase in size and then pain is noted and deglutition becomes uncomfortable. The dyspnea varies. In some cases it is entirely absent, while in others it becomes quite a serious concern accompanied by cyanosis, even to the extent where suffocation is imminent. A number of fatal cases have been recorded in literature that were directly due to suffocation. Tompkins (5) reported a case that had a sudden fatal termination and which upon autopsy revealed a greatly swollen epiglottis. Another case in a boy aged eight was reported by Crisp (6). The child had been ill for three days and suddenly choked to death. Postmortem examination disclosed no other lesion but an enlarged, swollen epiglottis.

In the present day with all our modern improved methods for examination of the larynx, the diagnosis of acute phlegmonous epiglottitis should offer little difficulty. With a history of pain in the throat, painful deglutition, and some interference with respiration, with a normal pharynx, an examination of the larynx either directly or indirectly will quickly disclose the seat of trouble. Examination usually reveals a reddened, congested and swollen epiglottis, the edema being confined as a rule to the lingual surface; but in many instances owing to the great intensity of inflammation the entire epiglottis is involved. The structure presents an enlarged angry looking mass obstructing the entrance into the larynx, so that a satisfactory view of its interior is often not obtainable. When the larynx can be seen, there is often secondary involvement and the arytenoid region and vocal cords may be somewhat congested. At other times there may be seen signs of suppuration as evidenced by one or more areas of pointing. In one of our cases two small abscesses were present located upon the anterior surface of the epiglottis. In another the abscess was situated at the base of the epiglottis on the lingual surface encroaching upon the adjacent lingual tonsillar tissue. When suppuration does occur it is usually limited to this aspect. The aryepiglottic folds, the arytenoid and interarytenoid areas, and the true cords, when complicating epiglottic inflammation, are secondarily and only mildly involved, edema rarely being present and suppuration never occurring.

A condition simulating acute phlegmonous epiglottitis and from which it must be differentiated is angioneurotic edema. This latter condition may involve the epiglottis, but seldom alone. The edematous structures instead of being angry red are pale and greyish in color with evidences of inflammation being absent both locally and generally. A point of great importance in the differential diagshould carefully radiograph the lungs and adjacent and distal joints to the bony growth in searching for metastatic involvement before operating in sarcoma, or making a diagnosis. In myosarcoma, the whole shaft usually shows pathological conditions. At operation, if one finds a bloody cavity, it is a safe inference that the growth in the bone is sarcomatous. If the contents of the cavity are meatlike it is probably giant cell sarcoma. In all these cases of sarcoma, the pathologist's report must be taken guardedly.

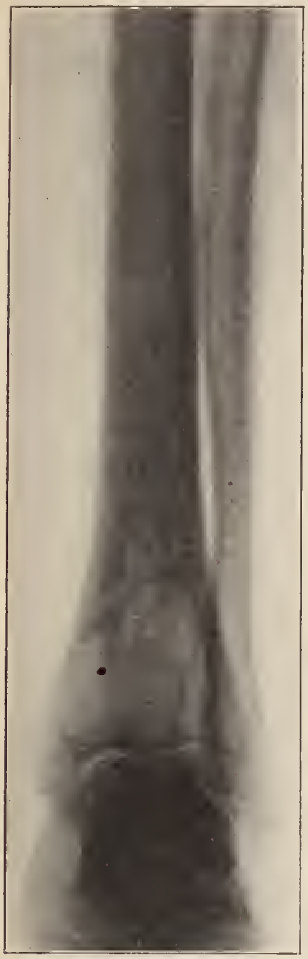
FIG. 3.—X ray taken four months after operation showing repair and filling up of the bony cavity, all except an area three and a quarter inches by half an inch.

Radium.—Radium has no effect in bone cysts, either as a therapeutic test or otherwise therapeutically. According to Bloodgood, the effect of radium in lymphosarcoma is so startling as to suggest it as a therapeutic test. Time alone will suffice to test its permanent therapeutic value, which thus far seems encouraging. It has no effect on bone cysts or upon the other varieties of osseous sarcomata.

In tuberculosis there is a marked decalcification of the involved bone, the pathology first being manifest in the epiphysis of the bone with marked rarefication due to osteoclastic changes involving also the periosteum, and finally the joint. The history, the von Pirquet test, and other general clinical findings, would help eliminate tuberculosis.

Exploratory incision, with removal of some tissue for pathological study, may be imperative to make a positive differential diagnosis. Syphilis, while usually easy to differentiate from cystoma, may resemble it clinically. In syphilis, however, there is periosteal and cortical thickening noted on the radiographic plate. The Wassermann reaction should be done, and the other clinical manifestations sought. In fact, today routine Wassermanns are the rule in all first class institutions. The conditions may coexist.

TREATMENT.

The treatment depends upon the size and location of the lesions. As Ginsberg and others have shown, pathological fracture may sufficiently stimulate osteoblastic functioning of the healthy bone and periosteum surrounding the cystoma as to result in a spontaneous cure. If operation is in order, exposure of the cyst, removal of the wall if it is present, crushing of the remaining soft bone, thoroughly curetting the surrounding bony cavity, and packing with ten per cent. iodoform gauze will be all the surgery necessary. The limb, following operation, must be properly immobilized over a proper time, thorough asepsis practised at each dressing, and the bone encouraged to granulate from below up. In properly selected cases the cavity may be filled with bone paste. If the cystic degeneration is extensive, subperiosteal excision, with tibial transplantation, may be carried out. The cyst wall, fluid, and curettings should be given careful pathological study.

CYSTOMA OF THE TIBIA.

CASE.—Mrs. I. S., born in Melino, Sweden, aged thirty-three years, came to this country when seven years old and has always resided in Brooklyn, N. Y.; is a housewife by occupation. The chief complaint was a severe sharp, tearing pain over the right ankle joint at its outer aspect. The patient had three sisters and two brothers, all alive and well. There was no family history of tuberculosis, diabetes, heart disease, rheumatism, nephritis, nor neurosis. The only disease the patient recollects having had is measles in childhood with an uneventful recovery. Her history for typhoid, pneumonia, scarlet fever, diphtheria, acute follicular tonsillitis, was negative. Seventeen years ago the patient had an attack of acute appendicitis, being suddenly seized with pain in the right side. She vomited several times and had some fever. She was operated upon by the late Dr. George Fowler and had a tube in her side for four weeks. It seems reasonable to presume that she had a ruptured gangrenous appendix. Unfortunately no cultural study was made at the time. Patient started to menstruate at the age of eighteen, had been always regular, of the twenty-eight day type and four day duration. She had never had premenstrual, menstrual, or postmenstrual pain. The patient had been married ten years, was pregnant twice but aborted twice, each time at six weeks of gestation, from unknown causes. She felt certain she was pregnant, because she described having passed something that looked like a little balloon once, when she aborted.

Four days after the patient was operated upon, she was suddenly seized with a sharp stabbing pain in the outer aspect of the right ankle, "very much like a toothache." She said that, childlike, she feared telling her surgeon of the symptom. It lasted five or six days and disappeared. About three or four months later it recurred and stayed with her about eight or nine days. The pain then left her for a period of two years, when it returned with such severity that she sought medical aid and made the

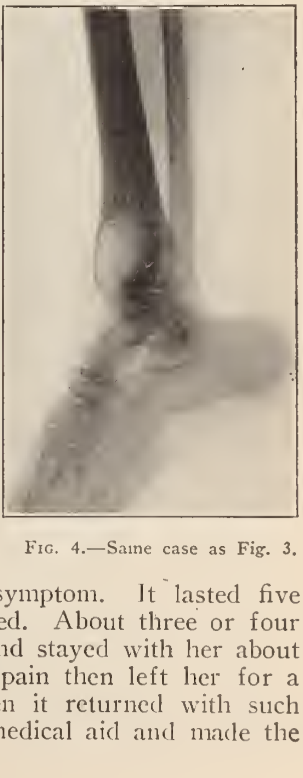
FIG. 4.—Same case as Fig. 3.

rounds. She had every diagnosis made ranging from rheumatism, neuritis, and neurasthenia, to hypochondriasis. As time went on, the pain recurred with renewed severity, was sharp, tearing, shooting in character, worse at night, and aggravated by barometric changes. Each attack lasted longer than the other, and the patient said she frequently received injections of morphine to give her sleep and relief. For the last six months before I saw her, she was entirely invalided, confined to bed or couch, and used crutches whenever she attempted to walk, which was on rare occasions only. During the last six months she had lost twenty pounds in weight, from loss of sleep, pain and worry. There had never been any swelling of the affected limb.

The patient was a markedly dejected person, of medium height, lean stature, weighing 118 pounds, with a normal temperature, pulse and respiration.

The head was of the brachycephalic type, free from lesions and stigmata of degeneration. The skin was light, moist, fairly firm, moderately elastic, and free from eruptions. The muscles were of good tone and fairly well developed. The eyes were bright, pupils reacting equally well to light and accommodation, no nystagmus, no tics, nor exophthalmos. There were no ocular or extraocular lesions. The teeth were in very poor condition, many were missing, and the gums showed a well marked pyorrhœa alveolaris. The mouth was moist, tongue clear and moist and free from tremor. The tonsils were slightly hypertrophied, but deeply placed. The neck was symmetrical, devoid of glandular enlargement, no visible abnormal pulsations, and the thyroid was not visibly enlarged. The epitrochlear, axillary, cervical, and supraclavicular glands were not palpable. A few moderately enlarged inguinal glands were palpable on both sides.

An inspection of the thorax showed the chest anteriorly and the scapulæ posteriorly to be normal. Litten's phenomenon was absent. Tactile fremitus was equally and normally distributed on both sides. Percussion yielded good, normal, pulmonary resonance throughout, except over the normal areas of dullness. Auscultation yielded no abnormal breath sounds or râles. An inspection of the heart showed the apex visible in the fifth interspace, three and five eighth inches from the midsternal line and of normal visible four. Percussion showed a normal sized heart in proper position. There were no palpable thrills and the apex thrust was of normal intensity. The first sound of the apex was slightly prolonged but devoid of impurity, the second sound at the apex was clear, sharp, and snappy. Both sounds at the bases were clear, with A2, slightly accentuated over P2. There were no audible murmurs in the neck, sides, or back. The heart was a normal one.

The abdomen was of the scaphoid type, but perfectly symmetrical. The spleen and kidneys were not palpable. The liver, on deep respiration, was palpable one and a half fingers below the costal arch, of even contour, and not tender. An eight inch incision, longitudinal to the right rectus muscle, rather coarse and rough, marked the site of the incision for her appendectomy and showed previous infection and drainage.

The arms were perfectly normal. The right ankle showed marked limitation of flexion and extension, but no swelling or discoloration. There was no atrophy of the limb apparent. The left lower extremity was normal.

LABORATORY FINDINGS.

Urine.—Chemical examination on December 14, 1919, of a twenty-four hour specimen, showed 1,800 c. c., clear, reaction acid, color light. Albumin was absent by heat and nitric acid, Heller's, and acetoferrocyanide tests. Glucose reaction with Benedict's reagent was negative. Acetone, diacetic acid, bile, and diazo reactions were negative. The indican reaction was strongly positive.

Blood counts and differential.—Red blood cells, 4,850,000; white blood cells, 10,280; hemoglobin, ninety per cent. by Sahli. Number of cells counted, 200; color index, 92. Polymorphonuclears, sixty-eight per cent.; small lymphocytes, twenty-eight per cent.; large lymphocytes, three per cent.; eosinophiles, one per cent.; no mast cells, transitionals, or degenerates noted; no myelocytes noted; nucleated reds not present; no change in shape or diameter of the red cells was noted. There was no polychromasia. There were no plasmodia, nor other abnormal elements visible. The platelets were moderately increased.

Wassermann reaction was negative. Blood pressure, systolic, 128; diastolic, eighty. X ray report showed a probable cyst in the lower portion of the shaft of the tibia, involving the epiphysis. The possibility of a low grade of infection should be considered. The cyst was about the size of a small egg.

Because of the severity of the patient's symptoms, operation was decided upon.

Under ether anesthesia, a curved two inch incision, extending forward from the internal aspect of the ankle joint, was made. The tendons were carefully retracted, the periosteum exposed and separated off, and the compact bone chiselled into with a curved gauge covering an area about three quarters of an inch in circumference. The white cyst wall came into view. An aspirating needle was plunged in and cultural plants carefully made.

The cyst was about the size of a small hen's egg, and separated below from the ankle joint proper, by the articular surface of the tibia only. The cyst wall readily peeled off, and was about one thirty-second of an inch in thickness. The surrounding bony bed was thoroughly curetted and packed with ten per cent. iodoform gauze, and encouraged to granulate from below up. I swabbed the bony cavity with phenol and alcohol before packing. In ten weeks the wound closed, and in twelve weeks the patient began to walk.

A pathological examination of the specimen was made by Dr. Horace Greeley, whose report was as follows: "Examination of fluid from cyst abscess in tibia of Mrs. I. S., showed a good many polynuclear leucocytes (pus cells), and very few diplococci. Cultures from the fluid showed gram positive diplococci, which grow feebly on nutrient agar and Loeffler's medium as gram positive staphylococci, without production of pigment. Examination of tissue showed pyogenic membrane of connective tissue, infiltrated with round cells to varying degree in different areas."

The cyst fluid was opalescent in color, and contained shreds of white fibrous material. There was about ten c. c. in all. The albumin content was high."

It seems reasonable from the history and pathological findings in this case to assume that the cyst was secondary to an embolic infection of a metastatic nature, from the infected appendix this patient had seventeen years ago. It is further interesting to note that the staphylococcus could still be cultured from the cyst fluid after that long period.

In concluding this paper I wish to thank Dr. Horace Greeley for his pathological work, Dr. Charles Eastmond for his radiographic interpretation, and my assistant, Dr. J. Skeer, for his help in compiling the bibliography.

REFERENCES.

1. Beck, Carl: Osseous Cysts of Tibia, *American Journal of the Medical Sciences,* 1901, v. cxxi, p. 666.

2. Bloodgood: *Ibid,* December 1, 1907.

3. Murphy: Clinics at Mercy Hospital, Chicago, October, 1913, *ibid,* p. 783.

4. Warner, F.: Cysts of Femur Treated by Tibial Bone Transplants, *American Journal of Medicine and Surgery,* v. i, p. 636.

5. Bogardus: Case of Cyst of Trochanter, *New Jersey Medical Journal,* March, 1916, v. xiii, p. 129.

6. Ginsberg: *Annals of Surgery,* April, 1917, p. 513.

7. Gannon, J. A.: Cyst of Femur, *Washington Medical Journal,* May, 1918, v. xvii, p. 193.

8. Meyerding: Cystic and Fibrocystic Disease of Long Bones, *American Journal of Orthopedic Surgery,* 1918, v. xvi, p. 253; 1918, v. xvi, p. 367.

9. Platau, E.: Cysts and Socalled Giant Celled Sarcoma, *Annals of Surgery,* October, 1918, v. lxvii, p. 367.

10. *B. Polithini Policlinici* (sez. chir.), June, 1918, and July, 1919, 26:204, 26:217; November 15, 1919, 73:1562.

11. Lotch, F.: Conservative Treatment of Bone Cysts, *Deutsche med. Wochenschrift,* June, 1920, 46:260; August 21, 1920, 75:574.

12. Dale, W. Chalmers: Case of Cystic Disease of Fibula, *China Medical Journal,* July, 1920, 34:382.

The Influence of Weather Conditions on Morbidity and Mortality in Early Infancy*

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The results of this investigation are concerned with an inquiry into the sickness occurrence among infants in the cities of York and Homestead, Pa., with particular reference to the relations of weather conditions to infantile diarrhea. The investigation was made jointly by the State Department of Health of Pennsylvania and the Prudential Insurance Company of America, in cooperation with the United States Weather Bureau and local health promoting agencies. On account of the required brevity it is only possible to deal on this occasion with the essential facts of the investigation, while on account of the unusual weather conditions during the summer of 1920 the results, in the main, reflect the method pursued rather than the conclusions arrived at.

In a general way the investigation was unusually successful and a vast amount of new information was collected. There was practically no objection on the part of the population concerned, rich and poor alike rendering every assistance necessary to make the inquiry complete for the child population concerned. The cities of York and Homestead were selected at the suggestion of Dr. Wilmer R. Batt, State Registrar of Vital Statistics, of the State Department of Health of Pennsylvania, as being peculiarly representative of the predominating native population in the case of the former, and a predominating foreign population in the case of Homestead. For the city of York the total number of cases considered was 1,092, while for the city of Homestead the number of cases was 1,056. These figures represent practically the entire infant population of the two communities, there probably not having been more than twenty cases in which there was any objection to daily inspection and supervision for the purpose stated. The purpose was primarily to determine how far environmental conditions in the broader sense might possibly be correlated as causative factors in the excessive incidence of diarrheal diseases during the summer months. Unfortunately for the purposes of the investigation the summer of 1920 was the mildest on record for many years, the average temperature during the months of July and August having been 72.7 degrees F. for York and 71.0 degrees for Homestead, against a normal temperature during these two months of 73.9 and 73.2 degrees F., respectively.

Considering first the general results of nutritional conditions, Table I illustrates the results for York for the months of July to December, 1920. It is hardly necessary to emphasize the fact that in all such investigations it, of course, is of primary importance to know whether the children under observation are breast fed, or artificially fed, or fed by both methods combined. The accompanying table differentiates the three methods and clearly illustrates the excessive morbidity among infants artificially fed throughout the hot summer months.

TABLE I.

Infant Morbidity Correlated to the Method of Feeding, York, Pa., July-December, 1920.

All Cases under Observation.

	Total Cases	*Sick Cases Number*	*Sick Cases Per cent.*
Breast fed (throughout period of observation)	346	7	2.0
Breast fed and artificially fed (throughout period of observation)	74	..	..
Breast fed (method of feeding changed during period of observation)	365	26	7.1
Artificially fed (throughout period of observation)	307	42	13.7
Total	1,092	75	6.9

It is shown in Table I that the children who were breast fed only during the entire period of observation suffered a sickness rate of two per cent., whereas those who were artificially fed throughout the entire period of observation suffered a sickness rate of 13.7 per cent. Midway between the two are the children who were breast fed and artificially fed, who suffered a sickness rate of 7.1 per cent. These results are so much more striking when it is considered that the temperature conditions were favorable to a low general sickness occurrence.

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*Read before the Second English Speaking Conference on Infant Welfare, London, July 7, 1921.

The second group, including 365 children who were subjected to a changed method of feeding during the period of observation, is given in Table II.

TABLE II.

INFANT MORBIDITY CORRELATED TO THE METHOD OF FEEDING, YORK, PA., JULY-DECEMBER, 1920.

(Cases only in which changes were made in the method of feeding during the period of observation.)

	Total Cases	*Sick Cases*	
		Number	*Per cent.*
Breast fed to partially artificially fed....	298	19	6.4
Breast fed to wholly artificially fed......	67	7	10.4
Total......	365	26	7.1

According to this analysis the children whose feeding was changed from the breast to partially artificial methods suffered a sickness rate of 6.4 per cent., whereas the children who were changed from the breast fed to the wholly artificial method of feeding suffered a sickness rate of 10.4 per cent.

Rather as an indication of the method of analysis than as regards the conclusions arrived at, a supplementary table is included (Table III) showing the differences in the sickness rate before the change in food and after.

TABLE III.

INFANT MORBIDITY CORRELATED TO THE METHOD OF FEEDING, YORK, PA., JULY-DECEMBER, 1920.

Cases showing variation of the sickness rate before and after the method of feeding was changed.

	Before Method of Feeding was changed.		*After Method of Feeding was changed.*	
	Number.	*Per cent.**	*Number.*	*Per cent.**
Breast fed to partially artificially fed	12	4.1	7	2.3
Breast fed to wholly artificially fed	2	2.9	5	7.5
Total......	14	3.8	12	3.3

*These percentages are of the total number of children, in the respective classes under observation, whose method of feeding underwent a change during the period they were under observation.

The very slight incidence of general sickness, of course, precludes definite conclusions.

TABLE IV.

INFANT MORBIDITY CORRELATED TO THE METHOD OF FEEDING, HOMESTEAD, PA., AUGUST-OCTOBER, 1920.

(All Cases under Observation.)

	Total Cases	*Sick Cases*	
		Number	*Per cent.*
Breast fed (throughout period of observation)	429	7	1.6
Breast fed and artificially fed (throughout period of observation)..........	95	4	4.2
Breast fed (method of feeding changed during period of observation)........	196	10	5.1
Artificially fed (throughout period of observation)	336	9	2.7
Total.......	1,056	30	2.8

For Homestead, the data, unfortunately, are only for the period of August to October, when the Homestead investigation was discontinued (Table IV). In this investigation the results are somewhat at variance with those derived from the York investigation, which for the present purpose may be considered, on general principles, more conclusive. But even in the Homestead figures the breast fed children show the lowest sickness rate, or 1.6 per cent.; while the children subjected to a change of feeding during the period of observation, or from breast feeding to artificial feeding, suffered the highest rate, or 5.1 per cent. The artificially fed children suffered a sickness rate higher than the breast fed, but the data, as said before, must be considered inconclusive.

I give, for the purpose of completeness, additional data as regards changes in the method of feeding, which, though rather contradictory, are explained on the ground of entirely abnormal weather conditions (Table V).

TABLE V.

INFANT MORBIDITY CORRELATED TO THE METHOD OF FEEDING, HOMESTEAD, PA., AUGUST-OCTOBER, 1920.

(Cases only in which changes were made in the method of feeding during the period of observation.)

	Total Cases	*Sick Cases*	
		Number	*Per cent.*
Breast fed to partially artificially fed....	64	8	12.5
Breast fed to wholly artificially fed......	132	2	1.5
Total......	196	10	5.1

For the same reason I add the final table of this series (Table VI), merely, as said before, as an indication of the method followed, rather than as regards the value of the conclusions arrived at.

TABLE VI.

INFANT MORBIDITY CORRELATED TO THE METHOD OF FEEDING, HOMESTEAD, PA., AUGUST-OCTOBER, 1920.

(Cases showing variation of the sickness rate before and after the method of feeding was changed.)

	Before Method of Feeding was changed.		*After Method of Feeding was changed.*	
	Number.	*Per cent.**	*Number.*	*Per cent.**
Breast fed to partially artificially fed	1	1.6	7	10.9
Breast fed to wholly artificially fed	1	.75	1	.75
Total......	2	1.0	8	4.1

*These percentages are of the total number of children, in the respective classes under observation, whose method of feeding underwent a change during the period they were under observation.

It is my intention to discuss, in full detail at a later date, the larger aspects of this problem, for obviously, practically the whole question of weather conditions in relation to disease is involved, and without some preliminary consideration of local weather phenomena—normal and abnormal weather conditions—the facts in the case are not likely to be thoroughly understood. It will be sufficient for the present purpose to restate the conclusions in tabular form (Table VII) as a correlation table in which maximum and minimum temperatures are shown jointly with prevailing sickness rates from diarrhœal diseases only.

TABLE VII.

CORRELATION BETWEEN DAILY EXTREMES OF OUTDOOR TEMPERATURES AND MORBIDITY FROM DIARRHEAL DISEASES AMONG INFANTS.* YORK, PA., JULY-DECEMBER, 1920.

(Mean Daily Sickness Rates from Diarrheal Diseases in 1,000 Infants under Observation.)

Daily Maximum Temperatures (Degrees Fahrenneit)	*Daily Minimum Temperatures (Degrees Fahrenheit.)*						*Entire Range*
	20-29	30-39	40-49	50-59	60-69	70-79	(20-79)
80-89	..	..	4.4	9.8	11.2	11.0	10.6
70-79	..	..	6.9	8.6	9.4	11.1	8.6
60-69	..	4.4	8.9	9.2	7.8	..	8.6
50-59	..	4.4	6.2	..	..	..	5.5
40-49	4.2	1.4	3.0	..	..	..	2.3
30-39	1.5	1.7	..	..	..	..	1.6
Entire range: 30-89	2.4	2.4	6.2	8.9	10.0	11.0	

*The sickness rates and temperature extremes are of the same day.

This table clearly indicates an excessive sickness frequency from diarrheal diseases when the maximum temperatures coincide with high minimum temperatures. It is a safe inference that when the maximum temperatures are likely to exceed 70°, while the minimum temperatures exceed 60°, the normal sickness rate from diarrheal diseases among infants under one year of age will be easily ten times the prevailing rate during cool days, when the maximum temperature is from 30° to 40°, and the minimum from 20° to 30°. The table shows a consistent rise in the rate of sickness incidence from 1.6 in 1,000 infants under observation during the lowest maximum temperature to 10.6 during the highest, and from 2.4 in 1,000 during the lowest minimum temperature to 11.0 during the highest.

This result may safely be referred to as a definite conclusion so much more trustworthy since the basic facts were relatively limited and the temperature conditions as such were rather abnormal. Had the investigations been made during a typical central Atlantic summer month, when high prevailing maximum and minimum temperatures occur for days in succession, it is a safe inference that the facts would be even more startling, although they could hardly have been more convincing.

I have considered the question as to the probable effect of a lag in time, but unfortunately the number of cases has not been sufficient for the purpose. It seems best, therefore, not to include at the present time the supplementary table prepared showing the sickness incidence for the first, the second, and the third days removed from the days of excessive temperature conditions.

For Homestead, the results are quite similar though less conclusive. A summary statement of the correlation data is given in Table VIII.

TABLE VIII.

CORRELATION BETWEEN DAILY EXTREMES OF OUTDOOR TEMPERATURES AND MORBIDITY FROM DIARRHEAL DISEASES AMONG INFANTS.*
HOMESTEAD, PA., AUGUST-OCTOBER, 1920.

(Mean Daily Sickness Rates from Diarrheal Diseases in 1,000 Infants under Observation.)

Daily Maximum Temperatures (Degrees Fahrenheit.)	*Daily Minimum Temperatures (Degrees Fahrenheit.)*						*Entire Range*
	20-29	30-39	40-49	50-59	60-69	70-79	(20-79)
80-89	..	..	..	..	2.7	2.4	2.6
70-79	..	..	2.0	2.0	2.3	3.4	2.2
60-69	..	..	1.0	2.0	..	..	1.7
50-59	..	..	1.0	..	..	..	1.0
40-49	..	..	1.0	..	..	..	1.0
Entire range: 40-89	..	..	1.4	2.0	2.4	2.7	..

*The sickness rates and temperature extremes are of the same day.

On account of similarity in the results this table does not require extended consideration. The Homestead figures justify the same conclusion as was advanced in the case of York, that there is a consistent rise in the sickness rate from diarrheal diseases of infants under one year, with an increase in both maximum and minimum temperatures. It would be possible, of course, to enlarge considerably upon the technical aspects of this phase of the investigation, but that would carry me too far into the field of practical meteorology, not of particular practical importance to those who are concerned with questions of infant welfare. But the suggestion may be made at this time as a conclusion forced upon me by the investigation under consideration, that it would seem entirely feasible to develop this line of inquiry in the direction of applied meteorology to the point of forecasting weather conditions favorable to an epidemic outbreak of infantile diarrhea.

This should not involve very serious practical difficulties, for the science of weather forecasting is now so thoroughly well known that it would only be necessary to take the approximate facts into account whenever such weather changes would be likely to occur in particular localities or large areas and to add a single code word to the telegraphic announcement, which would then be given local emphasis by the local weather observer. By this means every mother could be promptly informed through the newspapers of impending weather changes likely to prove disastrous to child life, amplified by proper suggestions from the board of health, or otherwise, as regards the danger of artificial feeding; and last, but not least, changes in feeding methods during abnormal temperature conditions. The method by which this could be brought about is, of course, a matter of detail which would have to receive very careful consideration, but after discussing the question with some of the foremost authorities on weather science, I have met with no serious objections to the practical feasibilities of the method indicated. If some such plan should prove possible a very important advance would have been secured in the direction of making the infant death rate more subject to human control than is the case at the present time.

Maternity Homes*

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Under the maternity and child welfare act, 1918, residential provision may be made with the sanction of the Ministry of Health for various conditions affecting the health and welfare of expectant and nursing mothers and children under five years of age. Broadly speaking, such accommodation may be divided into, first, homes and hospitals established primarily on medical grounds, such as maternity homes, infants' hospitals, and convalescent homes; and secondly, homes founded largely for social reasons, though the maintenance of the health of mothers and infants is an essential factor in their organization, for example, homes for unmarried mothers and their infants or for healthy babies who are illegitimate, orphaned or deserted. I propose to discuss only one type of institution, namely, maternity homes.

The Ministry have now recognized between sixty and seventy maternity homes in England and Wales, with about seven hundred beds, and some twenty proposals for new homes are now under consideration. This is in addition to maternity beds found in homes for unmarried mothers, and in addition to old established maternity hospitals and poor law lying-in institutions.

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*Read at the Second English Speaking Conference on Infant Welfare, July 5, 1921.

THE NEED FOR MATERNITY HOMES.

The great reduction in the infant mortality rate which has taken place during the past twenty years has not been accompanied by a corresponding lowering of the maternal mortality rate, as is shown by the following table:

				Maternal Mortality ‖ *(Classification as in use before 1911)*			
					Deaths to 1,000 births		
Year	*Birth rate*	*Death rate*	*Infant Mortality rate*	*No. of deaths*	*Sepsis***	*Other Causes*	*Total Childbirth*
1905	27.3	15.3	128	3,905	1.87	2.33	4.20
1906	27.2	15.5	132	3,757	1.75	2.27	4.02
1907	26.5	15.1	118	3,520	1.60	2.23	3.83
1908	26.7	14.8	120	3,361	1.48	2.09	3.57
1909	25.8	14.6	109	3,379	1.56	2.14	3.70
1910	25.1	13.5	105	3,191	1.42	2.14	3.56
1911	24.3	14.6	130	3,236	1.52	2.15	3.67
1912	23.9	13.3	95	3,299	1.47	2.31	3.78
1913	24.1	13.8	108	3,271	1.34	2.37	3.71
1914	23.8	14.0	105	3,469	1.63	2.32	3.95
1915	21.9*	15.7†	110	3,210	1.56	2.38	3.94
1916	20.9*	14.4†	91	3,038	1.47	2.40	3.87
1917	17.8*	14.4†	96	2,446	1.39	2.27	3.66
1918	17.7*	17.6†	97	2,353	1.35	2.20	3.55
1919	18.5*	13.8†	89	2,852	1.76	2.36	4.12
1920	25.4	12.4	80	3,942‡	1.87	2.25	4.12

* Based upon populations specially estimated for this purpose.

† Based upon civilian deaths and estimated civilian population.

‡ Subject to slight alteration.

‖ Excluding deaths not classed to pregnancy and childbearing, but returned as associated therewith.

** Including phlegmasia alba dolens.

NOTE.—In the Registrar General's annual report for 1920 the birthrates and the deathrates, 1911-1920, will be based upon revised estimates of population made after the results of the next census become available. The rates in the Registrar General's report may differ, therefore, from those in the above table.

In 1900 the infant mortality rate was 154 in a thousand births and the maternal mortality rate 4.8, the total number of maternal deaths due to pregnancy and childbearing being 4,455. In 1920 the infant mortality rate had fallen to eighty, but the maternal death rate was 4.2 with 3,942 deaths. During the earlier years of the century there was a slight though fluctuating improvement in the maternal death rate, 3.5 in a thousand births being the lowest figure reached. In 1919, however, the Registrar General reported that puerperal mortality was higher than for any year since 1905 and that the increase was preponderantly due to sepsis. This was sufficiently arresting, but it is still more disquieting to learn that in 1920 there has been no decrease in the maternal death rate, which remains as in 1919 at 4.12 in a thousand. The death rate from septic infection in 1919 was 1.76 but in 1920 it was still higher, being 1.87, the same rate which obtained in 1905. In other words, in spite of our modern knowledge of the causes and prevention of infection, of the successful application of this knowledge to the practice of surgery, and of the elaborate training given to medical students and nurses in surgical technic, we are, as regards midwifery, almost back in our old position at the beginning of the century before the midwives act was passed.

Most maternal deaths at the time of childbirth are preventable if proper facilities and reasonable skill are to hand, and deaths from septic infection should be rarely met with. Sepsis is almost invariably introduced from without by one or other of the attendants on the woman, the doctor, the midwife or the handywoman. Every vaginal examination with imperfectly cleansed fingers is fraught with danger, every forceps delivery is a potential source of sepsis either because the forceps are not used under aseptic conditions, or because lacerations may be caused which allow the entry of infection. Thus in 1920, 3,942 women died and a much larger number were injured, many of them permanently, from causes which are almost entirely avoidable. It is a matter of common knowledge that a large proportion of the patients in gynecological out patient departments seek advice because of the effects of bad midwifery, and that much of the chronic ill health from which so many working class mothers suffer may be traced to the same cause. Such facts are a grave commentary upon the standard of midwifery practice in this country. The majority of those women might have been saved suffering and even death if the needful facilities had been available for their treatment and if practitioners of midwifery were better instructed and more alive to their responsibilities.

The Ministry of Health is anxious to do all that is possible to encourage effort to combat this regrettable and unnecessary loss of life and health. Action may be directed: 1. Toward improving the midwifery service in the homes of the people by ensuring more skilled and careful professional attendance, and by providing a supply of sterile equipment and appliances for those who cannot afford to pay for them. 2. It is also essential to increase the accommodation in maternity homes and hospitals so that all mothers requiring in patient treatment may be able to obtain it and may be assured of safe and cleanly methods of delivery, while the obstetrician may be in a position to practise any operative measures which are needed unhampered by the difficulties inevitable in the private house. 3. There is the need for a study of the physiology of normal pregnancy, labor and lactation, our knowledge of which is far from complete, and which was one of the reasons for the establishment of such an institution as the Kaiserin Augusta Victoria-Haus in Berlin as long ago as 1909. A sufficient number of maternity beds, therefore, is one of the most important the gracious example set two years ago by Her requirements of a complete midwifery service, and Majesty the Queen in founding a Maternity Home at Hampstead has done much to stimulate their provision.

Until recent years almost the only accommodation beside the maternity hospitals in some of the large towns was to be found in poor law institutions and in private nursing homes. Maternity hospitals were unable to admit even all cases from their own districts, and many parts of the country were entirely unprovided. Maternity beds are needed: 1, for the relatively small number of confinements in which a serious difficulty is anticipated; 2, for the much larger number where some abnormality is probable and where watchfulness is necessary to prevent possible mishap; 3, for unforeseen emergencies; 4, for the prematernity treatment of conditions likely to affect the health of mother and infant; 5, for those women who are physically normal but who cannot be confined safely and suitably in their own unsatisfactory homes; 6, for women, especially primiparæ, who would prefer to be confined in a home or hospital. There can be no question that if maternity beds could be provided for at least the first five groups many lives, both of mothers and of infants, might be saved, and many women spared incalculable suffering and ill health.

SOME ADVANTAGES OF SMALL HOMES.

After careful consideration the Ministry decided to encourage the establishment of maternity homes of, say, ten to twenty beds, for normal and slightly abnormal cases rather than hospitals for larger numbers, fully equipped to deal with any complications. First, because of the expense involved. Few, if any, local authorities could suitably set up a large maternity hospital, whereas many are prepared to maintain a simply fitted home. Secondly, existing maternity hospitals already deal with many of the seriously abnormal cases, and the women for whom the new beds were primarily intended were not those likely to be dangerously ill. Parturition, though requiring skilled attendance, is not an illness in the ordinary sense, and the formal routine of a hospital with operating theatres and elaborate equipment is better avoided as far as is consistent with the surgical cleanliness necessary to efficient midwifery. A physiological rather than a pathological atmosphere should be the aim. Many women who ought to have in patient treatment require persuasion to accept it. A sick woman about to be confined will not object to go to a hospital, but a woman who is not anticipating unusual difficulty or danger at childbirth usually prefers the smaller and more simply organized home. Further, it is desirable that maternity beds shall be accessible from the homes of the women they serve. The arrangements proposed in Wiltshire may be quoted as illustrating a scheme for providing maternity beds in a rural county where in patient accommodation is needed for women suffering from the ordinary emergencies of pregnancy and labor, and also for patients living in remote districts where neither doctor nor midwife can be obtained. It is suggested that there shall be five small centres rather than one home for the whole county, three to six beds being subsidized in existing homes or hospitals at Salisbury, Malmesbury, Swindon, Corsham and Calne. The fact that the beds are associated with other hospital or maternity provision meets the usual objections to the independent two or three bed maternity home which is so difficult to supervise properly and economically. They are needed in the large towns to supplement the hospital, but they are also needed in smaller towns and in country districts where the number of cases at any one time cannot be great, and though the administrative advantages of large central institutions are obvious these may be outweighed by practical considerations.

GENERAL REQUIREMENTS.

Maternity hospital construction is in a more or less experimental stage, and when the Ministry was considering what requirements might reasonably be made as regards accommodation, furnishing, staff, etc., it was found difficult to lay down any hard and fast rules. Few existing maternity hospitals are modern buildings, and poor law experience has proceeded along somewhat specialized lines. There were in 1919 a few maternity homes which had done admirable work for several years, for example, the Jewish Maternity Home in Whitechapel, and the Alexandra Maternity Home in Plymouth, but these were either in adapted houses or in buildings which had already shown themselves too cramped for their purpose. Still, a certain body of experience was available, and some general guidance being immediately necessary a memorandum[1] was issued in January, 1920, dealing with construction, equipment and organization, an endeavor being made to simplify the design and eliminate redundance and extravagance while insisting upon the minimum requirements for safety. The memorandum was concerned mainly with new buildings, but the recommendations were intended to apply as far as practicable to the alteration of existing houses, and in point of fact, owing to the high cost of building, most of the proposals submitted to the Ministry have been concerned with adaptation rather than new construction.

The maternity home should contain wards for lying-in patients (some of which may suitably be one, two or three bed wards), one, or preferably two, labor rooms, a prematernity ward, a duty room, a receiving room with bathroom, properly fitted sink rooms, a nursery, a laundry, and separation or isolation rooms, in addition to staff quarters. It should have an ample supply of hot water; there should be central heating and electric lighting; not less than fifteen to twenty beds should be provided when possible, as smaller homes are more costly to maintain efficiently in proportion to the work done.

Patients are usually delivered by midwives, medical aid being called in as and when necessary. It is often convenient to arrange that several local medical practitioners shall be invited to deal with emergencies, but it is important that the clinical supervision of the home as a whole shall be vested in one medical officer who will be responsible for the general standard of the midwifery practised and for the admission and discharge of patients. Whenever practicable a consultant medical officer should also be appointed. The matron should be a trained nurse as well as an experienced midwife and even in a small home should have at least one fully trained assistant. It is difficult to lay down a precise rule as to the number of additional staff required, but there should not be less than one nurse or pupil for every three mothers and babies by day and for eight to ten mothers at night, in addition to labor room and special staff.

LIMITATIONS OF ADAPTED BUILDINGS.

It is relatively simple to plan a new building, but it has been found extremely difficult to adapt satisfactorily and cheaply the large mansion which is usually suggested as an ideal maternity home. There are generally some good rooms for wards, often on two floors, and a fairly convenient labor room. Sanitary accommodation is always insufficient. A separation room away from the wards and yet convenient for nursing purposes is not easy to arrange, and provision for true isolation is almost always nonexistent unless specially built, so that maternity homes are seldom capable of nursing septic cases safely. Proposals for staff quarters are invariably inadequate for the comparatively large staff necessary for a maternity home, and rooms intended to be wards have often to be utilized as staff rooms. The dangers of incompletely equipped maternity homes are frequently overlooked, and with every desire to make no unreasonable demands the Ministry have then the ungrateful task of criticizing and apparently discouraging schemes which have been passed locally as satisfactory.

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[1] Memorandum in regard to Maternity Homes and Hospitals, with plans. M. C. W. 15.

One of the chief difficulties is to secure separate accommodation for cases of puerperal sepsis. There should be at least one single room reserved for cases suspected of infection. Particularly when a small home is concerned, a committee may be unwilling to sacrifice a possible ward to a danger which it is anticipated will be remote, but having in mind the ever present risk of puerperal infection, the Ministry regard this as a fundamental requirement, and they further stipulate that if the room so set apart is not such that complete isolation of the patient can be effected, arrangements must be made for the immediate removal of all cases which are definitely septic. Though septic infection should be rare in a maternity home, it cannot always be avoided, as patients already infected may be admitted in emergency, but should infection so introduced spread to other patients the situation would *prima facie* be regarded as a serious reflection upon the organization and conduct of the home.

This is not the place to discuss provision for the treatment of puerperal sepsis, but it may be admitted that although one can insist on an infected woman being removed from a maternity home for the sake of the remaining patients, it is no easy matter to find a place to send her where she will be skilfully treated. The alternatives are usually the workhouse or a fever hospital, neither of which is satisfactory for the reception of a patient dangerously ill and needing advice and treatment by an obstetrician. In view of the high mortality from puerperal infection this is a matter which demands the early and careful consideration of local authorities.

RESULTS.

In order to check the results obtained in maternity homes, the Ministry require immediate notification of all maternal deaths which occur, and an annual return showing the results of the work as a whole. The following table summarizes returns made by fifty unselected homes for the year 1920 under certain headings, and the figures are of interest though not comparable with any statistical returns from the country as a whole:

		Cases delivered		*Notified puerperal sepsis*		*Ophthalmia neonatorum*		
No. admitted to home.	*Average stay.*	*By midwives.*	*By doctors.*	*Number.*	*Deaths.*	*Number.*	*Maternal deaths (including puerperal sepsis)*	*Fetal deaths (Stillborn or within ten days of birth)*
9,108	14 days	6,835	1,844	28	10	74	57	583

Among 9,108 women admitted, twenty-eight cases of puerperal sepsis occurred and there were fifty-seven maternal deaths, including ten from puerperal infection. When antenatal supervision is more fully developed it may confidently be hoped that the maternal mortality and the fetal mortality will be considerably reduced. At the same time it must be remembered that a maternity home, just as a maternity hospital, may be obliged to admit moribund patients for whom little can be done, and that more claims are more frequently made upon some homes than upon others, to admit patients who should rather be sent to a hospital for treatment if such were available.

CONCLUSIONS.

The secret of the success of a maternity home does not lie only in convenient accommodation, modern equipment and a competent staff. All these may be present and yet there may be comparative failure because the imagination of those responsible has not led them to conceive anything greater than a good nursing home. There must indeed be a conscientious application by the staff of the principles of aseptic midwifery, with no slurring over of details, and with accurate observation and recording of results. But this is not enough to satisfy a high standard. The right spirit and atmosphere are indispensable if the home is to become a source of encouragement to motherhood, an example of healthy contented maternity and a haven of hope and fortitude. The mother coming into the home should experience a sense of calm relief, and should instinctively feel assured of a successful issue. Wisdom in the management of labor is essential, especially perhaps in the earlier stages, so that the mother is not fatigued or exhausted before the final trial of strength and control becomes necessary. There should be continued watchfulness throughout the puerperium, and the patient should only leave the home when well on the way to complete physiological restoration and feeling rested and refreshed. Breast feeding should be regarded as a matter of course. Such an atmosphere is almost wholly personal, depending on all concerned in the management of the home, but most of all upon the matron and the inspiration she can give.

Properly directed and used, the maternity home will undoubtedly serve as one of the most effective weapons in the endeavor to raise the standard of midwifery and so reduce the disastrous death rate among mothers. Rightly conceived, it forms one link in a chain. Standing alone, its activities are restricted, but in relation on the one hand with the antenatal and postnatal clinic, and on the other with a maternity hospital (or medical school) and its consulting staff, in touch with the district midwifery of its own area and available for the local medical practitioner, its value as a treatment centre and as an example and incentive to sound midwifery practice can hardly be overestimated. For well managed midwifery secures something more than immediate safety, it serves as a means of encouragement to the whole instinct of maternity. Thus established and thus related a maternity home becomes an institution of the highest national importance, first, for the safe delivery of the child and the proper treatment of the mother, and secondly, for the advance of the science and art of medicine.

nosis is the absence of fever in angioneurotic edema.

As was pointed out before, the gravest danger lies in the mechanical obstruction occasioned by the enlarged epiglottis, thus interfering with respiration. Aside from this possibility there is little else to be feared. The affection is selflimiting and most patients recover without complications or sequelæ. An early diagnosis with proper treatment will minimize danger, shorten the period of convalescence, and thereby mitigate the patient's suffering to a great extent.

As soon as the diagnosis is established the patient should be placed in bed with the head propped up. Salines should be administered liberally for their depleting effect; an ice bag over the anterior aspect of the neck is greatly appreciated by the patient. An iced ichthyol spray as recommended by Meyji is beneficial in relieving the pain and reducing the inflammation. The chief indication for treatment of the local condition is early and deep scarification. This may necessitate repetition depending largely upon the circumstances and the local picture. The scarification should be deep enough to afford adequate drainage to the waterlogged tissues.

In those cases in which suppuration is well established early incision and the evacuation of the pus should be promptly attended to. This procedure is best accomplished by first spraying the parts with a ten per cent. solution of cocaine. Following incision the region should be cleansed by means of an antiseptic spray and repeated sufficiently often to rid the parts of mucus and pus. Dilatation of the incision occasionally becomes necessary if the pus reaccumulates.

As a rule, the condition quickly subsides in those cases in which early treatment has been instituted. In three to four days the patients are relieved so that they can partake of food comfortably. Complete resolution takes place at the end of a week or ten days and all that remains to be seen are the areas of scarification or incision.

Case I.—H. S., aged thirty-four, male, chauffeur, was referred to us by Dr. Malament on May 7, 1921. The chief complaint was pain in the throat, worse upon swallowing, accompanied by mild hoarseness. The patient had had the usual diseases of childhood, otherwise had been perfectly well. Was operated on for nasal obstruction five years ago, at which time a submucous resection was performed. The present illness dates back four days prior to our first examination. The patient went to bed feeling perfectly well and awoke the next morning complaining of a severe pain in the throat. The pain was increased upon swallowing. The condition became somewhat worse during the next twenty-four hours and hoarseness was noted. From that time on to our examination the condition remained practically stationary. At no period did the patient complain of dyspnea.

The urinary examination was negative, as was the venereal history. The temperature was 101.4°, pulse 100, respirations 26.

The pharynx was markedly congested; the uvula was slightly edematous; tonsils were small, buried and diseased. The epiglottis was swollen, reddened and congested. The involvement was limited practically to the lingual surface. A small area of pointing was visible over this aspect close to the base of the epiglottis. The adjacent lingual tonsil on that side was also swollen and inflamed. There was absence of edema of the arytenoids, interarytenoid region and the aryepiglottic folds. The vocal cords were slightly congested. With a history so typical, with symptoms so suggestive, with laryngeal findings so positive there was no question as to the diagnosis. No more typical case of acute phlegmonous epiglottitis could be demonstrated.

After spraying the throat and larynx with a ten per cent. solution of cocaine the epiglottis was deeply incised in the area of pointing at the base. Several drops of yellowish colored pus exuded. The parts were well cleansed and an application of twenty-five per cent. argyrol was made. The patient was put to bed and free catharsis established. An ice bag was placed over the anterior aspect of the neck, for which he was exceedingly grateful. The larynx was sprayed with an antiseptic solution at frequent intervals. The patient rapidly improved under this treatment and in the course of a day or two was greatly relieved. At the end of the week all symptoms had disappeared and the patient was completely cured. Examination showed the epiglottis had returned to normal with a linear scar to mark the site of our incision.

Case II.—Mr. L. G., twenty-five years old, a tailor, was admitted to the Beth Moses Hospital on May 18, 1921, suffering from symptoms of laryngeal obstruction—dyspnea, hoarseness and pain upon swallowing. The family history was negative. The patient was always a robust and vigorous individual, never having suffered from any serious illness. Three years previously he had had an attack similar to this one, but of much less severity. At that time the pain was less intense and the attack lasted only three days, coming on without any tangible cause. It subsided spontaneously.

Two days prior to admission to the hospital the patient began to experience a feeling of uneasiness and discomfort in his throat. The sensation he described was that of a foreign body which he could not dislodge either by coughing or swallowing. The morning after, hoarseness was noted and toward evening the condition became much worse. Pain upon deglutition became manifest simultaneously and the patient was unable to take solid food. Toward midnight dyspnea became apparent and early in the morning he was taken to the hospital. At the time of admission the temperature was 103°, pulse 98, respirations 26. The patient was markedly dyspneic, but cyanosis was absent. The house surgeon, Dr. Brody, admitted him to the medical service of the hospital. An ice bag was applied to the anterior of the neck and the patient otherwise made comfortable. The same morning we were asked to see the patient. Examination of the pharynx was negative. Inspection of the larynx revealed a large edematous angry red epiglottis; the entire mass being globular in appearance. The maximum swelling was located over the lingual surface, the laryngeal aspect, however, being also involved. The edema and inflammation were so intense that it was impossible to obtain a view of the interior of the larynx. There were two areas of pointing situated on the anterior surface of the swollen mass near the base of the tongue; the one on the left side appearing as though it were ready to rupture. A diagnosis of acute phlegmonous epiglottitis was made and prompt treatment instituted.

After spraying the parts with a ten per cent. solution of cocaine, the epiglottis was freely incised through the pointing areas and about a dram of foul smelling pus was evacuated. A culture showed streptococcus and pneumococcus. Immediately after incision, the patient was greatly relieved. An icebag was continued over the anterior of the neck and the throat frequently sprayed with a solution of hydrogen peroxide. Improvement quickly followed and the patient left the hospital three days later. Subsequent examination in our offices showed the epiglottis completely returned to normal within a period of nine days.

CONCLUSIONS.

1. Acute phlegmonous epiglottitis is not as rare an infection as has been supposed. 2. It is primary in the epiglottis and may occur without any other demonstrable inflammation in the laryngopharynx. 3. It occurs as a distinct entity. 4. Its etiology has not been definitely determined, although most observers agree it is always infectious in origin. 5. It presents a clinical picture which in the majority of cases is similar. 6. The diagnosis should offer no difficulties.

REFERENCES.

1. Theisen, C. F.: American Medical Association, 1900.
2. Theisen, C. F.: *Albany Medical Annals,* July, 1900.
3. Lederman: *Laryngoscope,* xxiv, January, 1914, No. 1.
4. Kyle: *Diseases of the Nose and Throat,* 1904, p. 536.
5. *Lancet,* London, 1841, v. i, p. 705.
6. *Transactions Pathological Society,* London, vol. xxvii.

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Cystomata and Fibrocystomata of the Osseous System

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Before reporting the rather interesting case which has been the suggestive inspiration of this paper, it may not be amiss for us to consider briefly the anatomical and histological construction of bone tissue.

Anatomically, bones are of four types: long and short, flat and irregular. The long bones, with which we are chiefly concerned, may be macroscopically described as having a shaft or diaphysis, the outer layer of which is composed of compact or hard bone, the inner of cancellous or soft bone, surrounding a tubular cavity which contains marrow. This cavity is the medullary cavity, widest in its central portion, and tapering off toward the extremities, or epiphysis, of the bone, becoming continuous with the more compact cancellous bone there.

Histologically, we must regard bone in general as a special type of calcified white fibrous connective tissue, so modified through developmental and embryonic changes of a very definite symmetrical structural nature as to compose the skeleton of the particular bird, fish, or animal under study.

Structurally, bone is of two varieties, hard or compact, and soft or cancellous. The former is of dense construction, tough and somewhat elastic, occupies the outer surface of bones, contains definite systems named after Havers, who was the first to describe them, is capable of withstanding considerable force, and is completely covered by periosteum.

The long bones being the usual site of cystic degeneration, we are chiefly concerned with them. Their blood supply in main is through the nutrient artery (or arteries, of which there may be two), entering through the nutrient foramen, accompanied by a nerve, or nerves, courses obliquely through the compact bone, giving off branches in an upward and downward direction through the medulla of the bone, and anastomosing, as has already been stated, with the periosteal vessels, subdivides into capillaries, collects into fairly large sluggish venous trunks, entering the red bone marrow spaces and collects into small venules which leave the bone proper.

We recollect that the red marrow is prominent in the articular ends of the long bones and predominates in all cancellous bone. It contains the new ripe and unripe red and white blood cells. Yellow marrow has no hematopoietic function probably. It is rich in fat, is found in the medullary cavity of the shaft of long bones, and is derived from red marrow.

The cancellous, or soft bone, sometimes called spongy bone, consists of a reticulum made up of slender fibres and bone plates containing small meshes of marrow space. Cancellous bone is devoid of Haversian systems, but contains lacunæ and canaliculi. The rugged support to the epiphysis of a bone is dependent upon the concentricity of construction of the cancellous bone there, the lamellæ of which are so arranged in arched lines of formation which approach each other near the epiphysis where the lamellæ are almost perpendicular to the joint, giving added strength to the epiphysis. The cancellous bone is reinforced with extra osseous fibres near the epiphysis which give it added support.

HISTORY AND ETIOLOGY.

The literature of this pathological condition, up to a very recent date, has been comparatively meagre. The recent literature is far more lucid, and contains some contributions, particularly that of Meyerding of the Mayo institute, which is classical.

In 1876 the immortal Virchow described an osseous cyst of the humerus which he says was caused by a degenerated chondroma, and his opinion at that time was universally accepted. Virchow's theory, still regarded as a possibility in some cases, has been generally disregarded as a probability. There is no doubt that a chondroma may undergo a retrograde process, and the probability is that this occurred in Virchow's case. Rindfleisch in 1876 and Hirschberg in 1887 showed the occurrence of bone cysts in osteomalacia. In 1891 Von Recklinghausen described the general type of this disease and gave us some pathology. In 1901 Carl Beck (1) described two cases, one in a boy aged ten, the other in a girl of thirteen, in which cases he ventured trauma as the etiology. He considered them of an exceedingly benign nature, but cautioned in differentiating this condition from osteosarcoma. In 1903 Heineke reported some cases, and employed the radiograph, as suggested by Beck, in making a diagnosis. In 1904 Müller, of Philadelphia, asserts that he reported a case. In 1906 Miller reported forty-three cases. In 1907 Pfeiffer reported forty-nine cases and supported Beck in his contention regarding trauma as a cause of osseous cystomata and fibrocystomata. In 1907 Bloodgood (2) contributed an article upon this subject, and in 1910 he succeeded in gathering eighty-nine cases in the whole literature, sixty-nine of which had no definite cyst wall, and twenty that had a wall, which at operation could easily be removed. In 1911 Silver and Landon reported ninety-seven cases in the literature. In 1912 or 1913 Gwilym G. Davis, of Philadelphia, reported a case in a child four or five years old.

In his clinics at Mercy Hospital, Chicago, J. B. Murphy (3), in 1913, shed some light upon the subject. He disregarded trauma as an exciting cause, but recognized it as a predisposing one in many cases due to embolic metastatic infections, and pointed out that trauma, by pathological fracture, frequently suggested the presence of the condition. Some years ago he showed a case before the Virginia Medical Society which was secondary to gingivitis, and later complicated by acute appendicitis. In 1916 Bogardus (5) reported a case of cyst of the trochanter. In 1917 Ginsberg (6) reported two cases, one occurring in the humerus at its upper extremity, and the other at the lower end of the radius, pathological fracture in both cases revealing the lesion, and causing permanent cure. As early as 1887 Ashhurst said that such happy results did not always ensue. He later reported four cases, and believed that under twenty the condition was benign and that over twenty it was likely to be malignant. He was probably swayed to that belief because his case which occurred in young adult life and was diagnosed as cystoma, recurred and proved to be sarcoma. In 1917 Warner (4) supported Murphy's contention regarding the infective origin of many osseous cystomata, saying in part: "The majority undoubtedly start as an infection of bone, this infection being of a hematogenous nature, the blood having taken up the organism from some local point of infection. He regards trauma merely as a predisposing cause. Ropke, Lubarsch, Meyerding, Murphy, and others, report the detection by culture of organisms in the cyst fluid. In 1918 Meyerding (8) collected and reported thirteen cases, two of which gave positive cultural plants. In 1920 W. C. Dale reported a case occurring in a Chinese farmer aged thirty-two, in the upper half of the fibula, cured by operation. Unfortunately, cultures were not taken and radiographic study was not available. One sees, therefore, that bone cysts are a rare type of bone tumors, which tend usually to get well without operative interference.

Before concluding the etiology of cystomata and fibrocystomata of the osseous system, permit me to present Meyerding's classification of the types, somewhat modified, to make it a little easier to group in one's mind.

TYPES.

1. Local.
2. General (Von Recklinghausen).

1. Cystic degeneration of new growths, single, or multiple. a. Enchondroma (Virchow); b, giant cell sarcoma, which does not always spell malignancy; c, small round cell sarcoma; d, osteochondrosarcoma; e, myxoma; f, osteocarcinoma metastatica.
2. Callous, subperiosteal (hematomata, traumatic).
3. Osteitis deformans, osteomalacia.
4. Hydatid cysts.
5. Follicular odontomes or dentigerous cysts, occurring usually under twenty, and arising in the follicles of the permanent molars.
6. Mercurial poisoning.
7. Infections: a, tuberculosis; b, syphilis; c, microorganisms, such as staphylococci and streptococci.

PATHOLOGY.

The pathology of this disease is naturally dependent upon the antecedent etiological factors. Any bone may be the site of cystic degeneration, although the long bones are the ones usually affected. Most reported cases show the femur, tibia, fibula, or humerus to be involved. In Silver's series of ninety-seven cases, seventy-three per cent. showed the femur, humerus, and tibia most commonly affected in the ratio 6:5:3.

The first pathological change may be in the nature of an embolic process from some other point of infection, for example acute follicular tonsillitis or acute appendicitis. It may be in the nature of an acute osteomyelitis, in which the organisms may become attenuated and cystic degeneration finally result. The cyst fluid in such a case may become sterile and have a high albumin content (osteitis albuminosa). Why one case should light up an acute, highly virulent infection, demanding immediate operative procedure in the first twenty-four hours to save life, and another should wall off the organisms and inflammatory area, would be dependent upon the virulence of the organism and, to some extent, the resistance of the individual.

If we are dealing with hydatid cysts, the diagnosis is made from the detection in a cyst of fluid with a specific gravity of 1,005 to 1,015, albumin free, rich in sodium chloride and other inorganic salts, of scolices or free hooklets which have fallen off degenerated scolices, or particles of cyst wall with characteristic shreds of faintly laminated membrane from the torn edges. The search for hooklets is sometimes very difficult, but not usually so. "The cysts are sometimes barren, growing to considerable size without producing scolices" (Todd). This infection is relatively uncommon in the United States, occurring usually in Iceland, Australia, and to some extent in central Europe, in places where the individual lives in close contact with the dog, the mature tenia inhabiting the intestine of this animal. One must bear it in mind, however.

As has been said, osseous cystomata and fibrocystomata, may be single or multiple. The single variety usually begins near the middle of the diaphysis of the bone and its tendency is not to involve the epiphysis. Meyerding asserts that it never does, but that is not always so. The cyst may or may not have a lining; 17.8 per cent. have a definite, fairly tough lining, which peels off readily from its bony attachment. As the cyst grows, the cancellous bone is first involved and later the compact bone succumbs to the process, the periosteum remaining intact. The bone becomes thinned, fragile and readily bent, or pathologically fractured. Often the fracture calls attention to the pathological condition of the bone.

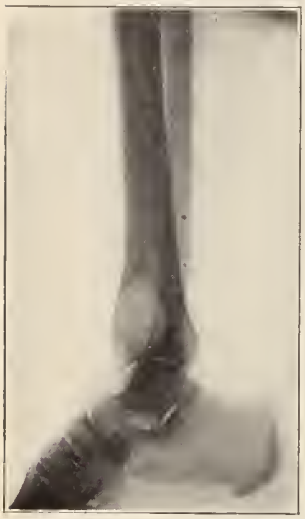

FIG. 1.—X ray photograph taken two weeks before operation.

After the initial cause, whether it is trauma preceding infection, metastatic infection, or other pathological etiological factors, the osteoclasts, large multinuclear cells appearing in Houslip's lacunæ, preceded by considerable osteoblastic change, with proliferation of some new lamellæ, is noted. Intervening, one may note numerous white fibrous elements. Petechiæ and ecchymotic areas may be observed throughout the pathological area, with considerable new vessel proliferation, actual granulation tissue resulting. Beyond contributing to some extent osteoclastic cells, the periosteum remains normal. The osteoclastic cells make their inroads destroying the bony elements *in toto,* actual fluid developing, and cyst formation resulting, showing a clear line of differentiation from the healthy bone. The involvement of the cancellous bone, and, subsequently, the compact bone, gradually advances, only the periosteum intervening between the cyst and the soft tissues above. Actual bulging may be noted macroscopically. In malignant neoplasms, with the exception perhaps of giant cell sarcoma, the periosteum becomes involved, corroded, and destroyed in the path of the growth. If the cystoma is of the multilocular type, various partitions of fibrous tissue separate the gross mass into several or many parts.

SYMPTOMS AND DIAGNOSIS.

Spontaneous fracture due to the slightest trauma or muscular action, may, as previously stated, first suggest the presence of the lesion. Essentially, this is a disease of childhood and early adult life, most cases occurring in patients under the age of thirty, but it may occur in later life. Sarcoma, on the other hand, more commonly follows bone injury than fracture. Bloodgood, who has studied this condition for a good many years, makes some very interesting reliable deductions regarding bone cysts. Given a bone tumor in a child of fifteen or under, the chances are that the neoplasm is benign and probably a bone cyst. This he puts in the direct percentage ratio of seventy-five per cent. to eighty-five per cent. The remaining fifteen per cent. to twenty-five per cent. of osseous neoplasms occurring in a central location would probably be sarcomatous. The younger the child the more probable is it that the neoplasm is a bone cyst. If the neoplasm springs from a periosteal rest the chances are even regarding malignancy. If associated with Paget's disease, the general diagnostic features of this disease are very apparent.

Pain.—This is a variable symptom; it may or may not be present. It may be the first symptom which causes the patient to seek medical aid. When present, it varies from slight tenderness and itching to such severity as to require sedatives for sleep and relief. On such occasions it is intermittent, sharp, lancinating in character, usually worse at night, and aggravated by pressure or motion of the affected limb.

Swelling.—As has been previously stated, bulging in contour, with a little pain over the part involved, may be the symptom first noted by the patient. Atrophy of the limb may occur.

X ray.—The interpretation by the radiograph is usually suggestive of a diagnosis, but must be weighed with the other clinical findings. It usually will differentiate it from other pathological conditions, the cystoma or fibrocystoma having a definite outline and an uninvolved periosteum. Let us repeat that in all types of malignant bone disease, with the exception of some giant celled sarcomata, whether we are dealing with sarcoma or metastatic osteocarcinoma, the periosteum becomes corroded and destroyed by the progress of the neoplasm. There is also an increase of abnormal bony elements noted in sarcoma, rapid growth, and subsequent cachexia.

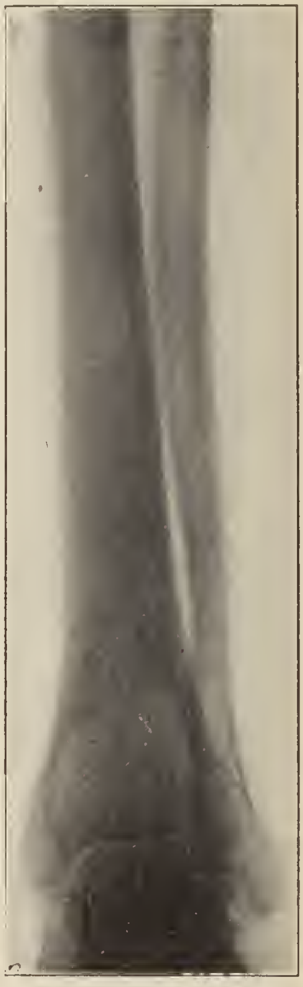

FIG. 2.—X ray photograph taken two weeks before operation.

The x ray findings in early periosteal sarcoma may confuse one, particularly when it resembles osteomyelitis. In other words, although sarcoma cells are present in the Haversian systems, they are not sufficiently closely packed to throw a suggestive shadow. In doubtful cases, the history, clinical findings and laboratory study would help considerably. If bone sequestrum is present the weight of evidence would be in favor of osteomyelitis. One of cancer of the heart, including Hayem's, Bucquoy's, Souville's, Proust's, Barthelemy's, Emeric Smith's (1840), Nicereau's (1868), Campana's (1859) and Latham Ormerode's (1847) cases and the cases reported by Cruveilhier (1837), Francis (1867), Aran (1846), Andral and Bayle (1824), Hewett (1847) and (1848), Fere (1880), Laennec, Cohn (1853), Paget, Sims (1833), Doleris, Brunon, Forster, Regnault, Letulle, Labric (1851), Segalas d'Etchepare (1825), Billard (1828), Prudhomme (1867), Andral (1874), Kink (1843) and Ollivier and a few others.

Norman Moore (38) reported three cases of metastic carcinoma of the heart. 1. A man aged forty-one, had a (primary) cancer in the right kidney, with metastases to the heart (wall of left ventricle) and lungs. 2. A man aged fifty-seven, with cancer of the esophagus (primary) and metastases to the (wall of right ventricle) heart, pleura, liver, kidney, suprarenals and lumbar glands. 3. A woman aged sixty-four, who had cancers in the skin (primary) and metastases to the lungs, pleura, peritoneum, spleen, kidneys, and glands. The heart contained many masses of the new growth and there were some in the pericardium.

Arthur Voelcker (39) reported a case of extensive metastatic deposits of carcinoma in the heart, in a woman aged sixty-one. During life there were no abnormal heart sounds. A large nodule of growth was present at the base of the papillary muscles in the right ventricle. Several smaller nodules were found in the walls and on the surface of the left ventricle and auricle. The primary growth was at the pyloric end of the stomach.

Ludwig Hektoen (as stated) presented three specimens of tumors of the heart before the Chicago Pathological Society, October 10, 1893. Dr. Hektoen (40) reports these cases, and refers to Tedeschi's (1893) review and the papers by Martinotti (1886) and Pil and Bret (1891). Hektoen was able to collect 110 instances of tumors of the heart, and states that "tumors of the heart are among the rarest of conditions. The majority of cardiac neoplasms are secondary, consequently, as a rule, either carcinomatous or sarcomatous, the first being the more frequent." His own cases were, 1, medullary carcinoma of the breast in a woman aged fifty years, who had a metastatic nodule in the wall of the right ventricle. 2. Spindle celled osteosarcoma of the tibia in a boy aged twelve, having sarcomatous metastasis in the right ventricle, and, 3, a primary round celled sarcoma of the epicardium of the anterior surface of the ventricles in an Indian woman aged fifty.

Lambert's (41) case of primary small round celled sarcoma occurred in a man aged thirty-nine years. Dr. Harman Brooks performed the autopsy. Extensive tumor growth was present in the wall of the left ventricle, and the pericardium.

Peters and Milne (42) report three cases of secondary tumors of the heart. 1. A case of carcinoma of the rectum in a man aged forty years with metastatic growths in the heart and lungs and liver. 2. Carcinoma of the pylorus with secondary involvement of the heart, liver and mesenteric glands in a man aged sixty-eight. 3. Mediastinal lymphosarcoma with involvement of the pericardium and heart in a man aged thirty-six.

Monckeberg, before the *Medizinische Gesellschaft* in Giessen, January 26, 1909, reported his (see above) case in a woman aged sixty with high grade coronary sclerosis and tumor of the heart.

PRIMARY SARCOMA OF THE HEART WITH METASTASES TO LUNGS AND PANCREAS.

The following is from the autopsy records (5875-1918-111) of the University of Pennsylvania. Vol. XXX, pp. 372-374. The date of the autopsy was August 5, 1918. The patient was from the service of Dr. Charles Potts, Blockley Hospital, Philadelphia. The autopsy was performed by Dr. Graf. (The sections were examined at my request by Professor Allen J. Smith, of the University of Pennsylvania, and he found sarcoma in the pancreas, heart, and lungs.)

The patient, J. A., was admitted to the hospital July 15, 1918, and died August 3, 1918. The clinical diagnosis was polioencephalitis, arteriosclerosis, and Bell's facial palsy. The histological diagnosis was secondary sarcoma (small cell polymorphous) of lung; primary small cell (polymorphous) sarcoma of heart; secondary sarcoma of pancreas; chronic interstitial nephritis; chronic interstitial splenitis. The gross anatomical diagnosis was, chronic adhesive pleuritis with effusion in left pleural cavity; chronic adhesive pleurisy of right lung; hemopericardium thickening of right ventricle wall (tumor) with parenchymatous degeneration of left ventricular wall; congestion of lungs with nodular (new growths); interstitial splenitis with increase of splenic tissue; right chronic interstitial nephritis with cystic degeneration; left chronic interstitial nephritis with parenchymatous degeneration; lobular cirrhosis; edema of brain; secondary tumors of the pancreas. There were some firm nodular areas in pancreas—probably new growths.

AUTOPSY REPORT.

The body is that of an adult emaciated male of about fifty years of age. The hair is fairly abundant and grayish; teeth in upper jaw absent, two gold crowns in lower jaw. The abdomen is scaphoid and green, abdominal muscle is scanty, abdominal cavity shows nothing abnormal except omentum and abdominal fat is lacking. Left pleural cavity contains 300 c. c. of blood tinged fluid, several firm adhesions posteriorly and to diaphragm; right lung has less extensive adhesion and pleural cavity is free from fluid; pericardium contains about 450 c. c. of blood tinged fluid.

The heart weighs 320 gms.; small in size and flabby; on the right ventricle and extending to pulmonary leaflets is a thick area dark bluish green and firm in consistency. Upon opening the right ventricle the area described is much thicker than the rest of the wall, measuring 1.5 cm. in width, while the wall at the apex is 5 cm. The pulmonary and tricuspid valves are apparently normal. The aortic leaflets are normal, but at the base of the aorta there is extensive atheromatous change; the wall of the left ventricle is soft and the muscle pale, with several dark areas, possibly postmortem changes. The mitral valve is normal in appearance and width.

The left lung weighs 450 gm.; shows nothing but congestion, excepting for a few places in the lower lobe where several areas about 2 cm. in diameter stand out primarily, firm, and of reddish color. The right lung weighs 500 gms.; likewise shows the same kind of lesions.

The spleen weighs 200 gms.; enlarged, dark in color, capsule wrinkled, firm in consistency; on section pulp is very dark and smooth, but surface glistening and watery. The suprarenals show extensive discoloration; otherwise normal.

The left kidney weighs 150 gms.; average size, dark in color and shows clear wall cysts on surface. On section cysts are seen to be filled with clear straw fluid; one of the cysts is about 2 cm. in diameter. Kidney pyramids slightly paler than cortex; capsule strips with increased resistance and leaves a very granular surface, and near hilum tears in substance. The right kidney weighs 110 gms.; smaller in size, much paler in color, it has several small cysts projecting on surface. Cut section shows cortex apparently increased in width and softer than the left. The capsule strips readily, leaving rather a corrugated surface. The ureters and bladder were normal.

There was nothing abnormal in the stomach, duodenum and intestines. The pancreas was normal in size, very dark in color, several firm nodular areas. An incision or areas showed red, smooth, finely granular surface with distinct appearance and outline and pancreatic tissue. The liver weighs 1,020 gms.; probably undersized, capsule bluish green in color, smooth probably postmortem condition. On section it was rather granular and firm. The greater portion of the liver was discolored.

The brain weighs 1,360 gms.; dura adherent to skull, considerable edema of gelatinous type in pia and arachnoid; excess of fluid at base; bloodvessels at base show atheromatous changes. Sections were prepared and examined histologically from the heart, lung, spleen, liver, kidney, and pancreas.

The epicardium is of usual thickness and with its underlying fat is infiltrated with a mass composed principally of cells of a sarcomatous nature. These cells are of various sizes some being large others small, mononuclear and having a pinkish protoplasm. An occasional spindle cell is noticed. There is considerable fibrinous intercellular substance present in the infiltration. A small amount of connective tissue is also present; endocardium not shown. Comparatively little muscle tissue is present, greater part having been replaced by the infiltration described. Remaining muscle fibres are narrow, faintly striated and have poorly stained nuclei. Larger bloodvessels are somewhat sclerosed.

Pleura somewhat thickened, slightly roughened, congested, and shows considerable leucocytic infiltration. Alveoli contain considerable œdematous material, a few red blood cells, an occasional leucocyte, and desquamated epithelial cell. Areas of infiltration similar to those described in the heart are seen scattered through the lung. The cells are very large. An occasional area shows some central necrosis. The larger bloodvessels are distended.

The capsule of spleen is smooth and somewhat thickened as also are the trabeculæ; follicles are somewhat smaller than usual in some areas, and contain some excess of degenerated red blood cells; pulp tissue contains considerable degenerated blood and relatively little of the usual cellular elements.

The liver capsule is smooth and very slightly thickened. There is a moderate increase of the interlobular connective tissue with replacement of some of the peripheral liver cells. A considerable amount of fat is also present in the peripheral cells of the lobules. Liver cells for the most part are somewhat swollen and granular but stain well and contain clearly stained nuclei. Some lobules show a moderate amount of congestion with beginning degeneration of the cells around the central vein. The bile ducts appear normal.

The renal capsule is roughened, somewhat thickened and infiltrated with round cells; glomeruli are small, congested, showing varying degrees of fibrosis. Some are completely scarred; tubules are lined with flattened, granular, degenerated, pale staining epithelial cells; lumens of tubules contain desquamated epithelial cells. There is considerable increase of intertubular connective tissue which in areas has compressed and replaced the tubules; medulla contains an excess of connective tissue which is compressing the straight tubules which are lined by flattened and degenerated epithelium. A few hyaline casts are noticed. A second section does not show a marked fibrosis as preceding section; tubules and glomeruli are much degenerated. An occasional cyst filled with pink homogeneous material is seen. Section of medulla not shown; larger bloodvessels somewhat sclerosed.

There is very little recognizable pancreatic tissue present. Where seen it shows marked fibrosis, the acini being compressed by the increased connective tissue; cells of the acini are small, granular, and poorly stained. Only occasionally are any islands of Langerhans present, which are much degenerated; greater part of section shows mass composed of an abundance of varying sized lymphoid cells in a reticulum of fibrin and connective tissue. Some areas of the mass show caseous appearing degenerations. A second section was unlike the preceding section.

SECONDARY MELANOTIC SARCOMA OF HEART, SPLEEN, AND THYROID.

CASE I.—University of Pennsylvania autopsy records, 1913, 62 (4177); vol. xxv. Service of Dr. Henry. Autopsy performed by Dr. Lynch, Blockley Hospital. E. F., aged fifty-four. Died April 27, 1913. Secondary sarcoma of heart, spleen, thyroid, kidney, pancreas, small intestine, and liver. Extensive metastases. Metastatic melanotic sarcoma of skin, bones, lymph nodes, serous membranes, gall bladder, urinary bladder, and right orbital tissue. (Enucleation right eye.) The heart showed secondary sarcoma of endocardium, epicardium, and myocardium.

SECONDARY LYMPHOSARCOMA OF THE HEART AND LIVER.

CASE II.—University of Pennsylvania autopsy records, 362, 1904, 299, pp. 501-505, vol. x. (Museum specimen 204, 206, 207, 208.) Autopsy by Dr. A. J. Smith. Abraham Mafford, Blockley Hospital, March 4, 1905. The patient was aged seventy. Admitted December 26, 1904. Died December 28, 1904. Lymphosarcoma of lymph glands, hypertrophy of heart and small islands of lymphosarcoma, slight cirrhosis and congestion and lymphosarcoma extension of liver and chronic parenchymatous nephritis. General involvement of mesenteric, retroperitoneal and right axillary lymph nodes.

SECONDARY MELANOTIC SARCOMA OF THE HEART, LUNG, AND INTESTINE.

CASE III.—Blockley Hospital, 286, 1904, 182. John Barceland, aged sixty-five. Service of Dr. David Riesman and Dr. Hearn. Autopsy by Dr. A. J. Smith. Report by Dr. Alburger. University of Pennsylvania autopsy records, vol x, 1904, pp. 270-275. Admitted to hospital May 26, 1904. Died July 15, 1904. Secondary large spindle celled sarcoma of lung, intestine, lymph nodes, heart, and adrenals. The tumor is a large spindle celled melanotic sarcoma, involving the retroperitoneal and mesenteric lymph nodes, liver, large and small intestines, and mesentery.

METASTATIC LARGE ROUND CELLED SARCOMA OF THE HEART, LUNGS, SPLEEN.

CASE IV.—University of Pennsylvania autopsy records, pp. 70-75; 3570, 1911, 18, vol. xxii. Mrs. C. (Dr. Allyn), April 7, 1911. (Private patient.) Autopsy by Dr. Karsner. Pigmented soft mole of the labium majus; metastatic large round cell sarcoma of heart, lungs, liver, spleen, pancreas, kidney, adrenals, and lymph nodes. The heart shows no tumor in parietal pericardium whatever. The epicardium shows in the right auriculoventricular groove two nodules one cm. in diameter, one of which is pigmented and the other not. At the apex, to the left of the ventricular groove, is a small slightly pigmented nodule. Over the right auricle posteriorly is a nodule, moderately pigmented, five mm. in diameter. Embedded in the substance of the left ventricular wall are numerous nodules three to four mm. in diameter, some pigmented.

METASTATIC SPINDLE CELLED SARCOMA OF THE HEART AND LUNG.

CASE V.—University of Pennsylvania pathological records, 3607, 1911, 50, vol. xxii., pp. 179-183. Admitted to hospital March 3, 1911. Died March 24, 1911. E. W., May 24, 1911, Blockley Hospital, aged fifty-five, negress. Autopsy by Dr. H. T. Karsner. Spindle cell osteosarcoma of femur with metastases to the heart and lung; chronic interstitial splenitis; chronic interstitial nephritis; cloudy swelling of liver. The heart weight was 375 gms., small, firm and brown. In the auriculoventricular growth of the junction of the posterior margin of the septum is a tumor nodule, measuring 3 by 1 by 0.5 cm. sharply defined and involving the muscle of the left ventricular wall to the depth of twelve mm., leaflets and chordæ tendinæ, and papillary apices are markedly sclerosed; foramen ovale is closed; endocardium slightly thickened in the left ventricle.

SECONDARY SMALL ROUND CELLED SARCOMA OF THE HEART AND PANCREAS.

CASE VI.—Blockley Hospital, 3952, 1912, 87, August 15, 1912. University of Pennsylvania autopsy records, vol xxiv, pp. 327-329. James Loughman, aged twenty-nine, white, male. Brown atrophy with secondary sarcoma of heart; small round cell sarcoma of neck; metastasis to pancreas. Service of Dr. Alfred C. Wood. Autopsy performed by Terrill and Keilty. The patient was admitted to the hospital June 17, 1912. Died June 25, 1912. Sarcoma of the neck (small round cell). The heart small, scant epicardial fat. Myocardium is pale, brownish red, firm; endocardium apparently normal valves; mitral valve thickened at the edge; pericardium normal. In the heart muscle there is rather a diffuse amount of dark brown pigment. The muscle fibres are atrophied, nuclei shriveled. About one of the larger blood vessels was found a collection of small round cells, which have the same distinctive type as the cells in the tumor mass. The pancreas shows nodular growths ranging from two mm. in diameter up to eight mm.; mesenteric glands throughout the peritoneum also enlarged. There is a large nodular mass on the left side of the neck extending from the mastoid posteriorly to the median line anteriorly and down into the mediastinum; right psoas muscle and bronchial glands show tumor involvement.

CASE IX.—University of Pennsylvania autopsy records, 1901, 247, vol. vi, pp. 276-278. Negress, aged twenty-eight. Blockley Hospital. Autopsy performed by Dr. Simon Flexner. Anatomical diagnosis, adenocarcinoma of mammary glands, with invasion of adjacent tissues, ribs, and pleuræ; metastases of axillary glands with involvement of right axillary vein and brachial plexus; metastasis of bronchial and supraclavicular lymph glands and of liver and kidneys; serofibrinous pleurisy. The glands at the reflection of the pericardium over the great vessels are enlarged and contain tumors. Heart weighs 230 gms.; pericardium smooth; cavity and valves of heart normal; aorta above the valves shows slight elevation without degeneration. The thyroid gland is free from tumor; spleen weighs 70 gms.; liver weighs 1580 gms.; metastases in each lobe, the largest mass being in the left lobe; bladder, adrenals, stomach, pancreas, intestines are normal. The kidneys show metastases.

CONCLUSIONS.

1. Tumors of the heart are not common.
2. Primary tumors of the heart are rare. There are about 150 cases on record in the literature.
3. Primary sarcoma of the heart is very rare. There are about forty cases recorded.
4. There are probably many cases of secondary sarcoma of the heart that are never reported in the literature. They are not comparatively much less common than secondary cancer of the heart.
5. Myxomata, rhabdomyomata, and fibromata of the heart are met with occasionally.
6. A case of primary sarcoma of the heart is reported.
7. Seven cases of metastatic sarcoma of the heart are reported. Two cases of secondary carcinoma of the heart and pericardium are reported.
8. A review of the literature is included.
9. The correct diagnosis of cardiac tumor has never been made clinically. Electrocardiographic, fluoroscopic and x ray examinations may be valuable aids in making such a diagnosis.
10. All cases of cardiac tumor should be reported.

[Reports of cases VII, VIII, and X, together with the list of references and complete bibliography, will appear in the author's reprints. Their omission was due to lack of space.—Editors.]

Editorial Articles

INDICATIONS AND CONTRAINDICATIONS FOR SPINAL ANESTHESIA.

Although an effort has been made by many surgeons, especially Chaput and Jonnesco and their collaborators, to make spinal anesthesia a routine procedure applicable in all kinds of operations in all regions of the body, taking the place of general narcosis with ether or chloroform, it is probable that the majority of surgeons at the present time regard it as a method applicable only in certain cases. This is unquestionably the most rational view.

Spinal anesthesia, whether produced by stovaine or similar drugs, has its indications, and it is evident that the principal indication is the site of the operation. In spite of the enthusiasm for this form of anesthesia and its extensive use, particularly in Rumania by Jonnesco's technic, it is nevertheless true that it is particularly indicated in operations on the lower limbs in the anoperineal region, on the pelvic organs, and in gynecological operations in general. Many surgeons maintain that it is to be used only in operations involving structures below the umbilicus, but experience shows that when Jonnesco's technic is employed with exactitude and manipulated by skill and prudence, the indications can be extended to all cases in which a sufficient anesthesia can be obtained by an injection given low down, that is to say, in the dorsolumbar region, consequently in the majority of abdominal operations.

In those cases where spinal puncture must be made in the dorsal region in order to obtain the necessary anesthesia, that is, for operations on the thorax and upper limbs, a certain reserve is in order. It cannot be denied that many surgeons, and Jonnesco in particular, have obtained perfect anesthesia without accident by high puncture, but, generally speaking, the anesthesia obtained in these conditions is often imperfect. The technic is more difficult and necessitates great skill on the part of the operator, not so much for the puncture itself as for the position in which to place the patient, as well as the dose of anesthetic employed. Spinal anesthesia would seem to have exceptional indications in operations on the skull, face and neck, as its use here entails real danger.

There are other considerations involved in the use of spinal anesthesia beside the site of operation. It possesses unquestionable advantage in army surgery or in country districts, as it does away with the necessity of an extra assistant often difficult to obtain. It also has advantages of another character. The patient, although insensible to pain, is conscious during the operation and in cases where the patient's consent may be necessary for extending the field of the operation, this is of the utmost importance to the surgeon.

Lastly, in a general way it may be said that lumbar anesthesia is indicated where there are contraindications for general anesthesia on account of organic cardiac lesions, a renal or pulmonary process, or a profound organic decline. Jonnesco maintains that there are no contraindications for spinal anesthesia, but in spite of this high authority we believe that in operations on the head and neck this form of anesthesia is distinctly contraindicated unless any other procedure of narcosis is impossible, a condition unlikely to be met with in practice. Jonnesco believes that age has no bearing on the indications for the use of lumbar anesthesia, yet some competent observers maintain that it is more useful in elderly subjects than in the young because of the thickness of the *scagliola,* which prevents diffusion of the anesthetic solution. Another contraindication is chronic suppurative processes of the viscera, such as arteriosclerosis and affections of the central nervous system, as well as renal or hepatic insufficiency when these are detected, as they should be, before operation is undertaken.

THE FUTURE OF MEDICINE?

"What is to be done? The doctors can do nothing, for medicine is powerless. Unhappily, it will not remain so for a long time. Much work will have to be done to rid humanity of the scourge of disease. But, surely, one day science will succeed in doing so; that will be chiefly through prophylaxis and rational hygiene. There will also be a new science—the science of death; it will be known how to make it less hard." So spoke Elie Metchnikoff at the time of his last illness. [*Life of Elie Metchnikoff,* 1845-1916, Olga Metchnikoff, Houghton Mifflin Co.] Metchnikoff, a grand figure in the world of scientific endeavor whose greater works were overclouded by the popularized ones on the bacillus of "long life." He ingeniously worked out the theory of phagocytosis; he studied many phases of life physical, physiological and psychical, and attempted to learn more of that great mystery—death.

Throughout his life and on his death bed Metchnikoff felt that "medicine is powerless." He had seen much of the evolution of medical science. He

Local Anesthesia in Dental, Oral, Nose and Throat Surgery

With Particular Reference to Nerve Blocking

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INJECTION AT THE TUBEROSITY.

Synonyms.—Tuberosity, zygomatic, upper postmolar, posterior superior dental, posterior tuberosity, posterior zygomatic, and posterior maxilla.

Object.—To reach and anesthetize the posterior superior dental nerve and its distribution.

Location.—The posterior superior dental nerve enters the maxilla at a point about one inch directly above the middle of the third molar tooth, measuring from the free gum margin.

Preparation.—Prepare three mils of one and a half per cent. procaine solution (this quantity includes one and a half mils of excess solution), and to this add one drop of suprarenal extract which makes a proportion of about one to 45,000. Select a sterile needle forty-two mm. long, of twenty-one gauge and equipped with a hub to fit the syringe used. The syringe best adapted to this injection is either a two c. c. Luer, a two c. c. Record, or a two c. c. Fischer type. Fill syringe with solution, invert so its point is upward, expel air bubbles, attach needle, and again expel air bubbles. Cleanse mouth and area of needle insertion with the spray. Palpate the posterior border of the zygoma to learn its curvature.

Specific technic.—With the index finger hold the cheek away from the molar teeth so the view will be unobstructed. It is well to have the patient's mouth partly closed so no strain shall be made on the muscles. Paint the area of the mucous fold above the last two molar teeth with the iodine mixture. Insert the needle point into the highest part of the mucous fold above the posterior root of the second molar (or the next to the last tooth in younger subjects) but about eight to ten mm. away from the gum, externally. Point the syringe so that the needle is directed upward, inward, and backward. The syringe and needle should be held at an approximate angle of 45° with a sagittal vertical plane (when viewed from the front) and the same angle with the occlusal plane (when viewed from the side). Advance the needle until it touches bone, keeping the bevel of the needle toward bone. Continue to advance the needle into the tissue, keeping the the side of its point against bone, until twenty mm. of the needle is in the tissue. The point of the needle is now very close to the foramen through which the posterior superior dental nerve passes. Here inject slowly one and a half mils of one and a half per cent. procaine solution, taking one and a half minutes to complete the injection. Withdraw the needle. See that the needle is in its proper place on the hub. Wait five minutes for anesthesia.

Nerve complications.—Frequently the mucous membrane of the gum is sensitive. This is due to the long buccal nerve whose branches carry sensation to this area. Block this nerve in accordance with instructions given below.

Accidents.—The needle may break or may puncture some veins of or near the pterygoid plexus. On removing the needle a hematoma may form on the cheek very quickly. If this should happen, there is no cause for alarm. It will pass away in a few days with no treatment. But these accidents cannot happen if the technic is carefully followed. Remember that soreness, fainting, shock or collapse will follow the use of old, discolored, unclean or non-isotonic solutions. This applies to all injections. Infection and dangerous abscesses will follow the use of unclean instruments. This applies to all work.

Remarks.—The resulting anesthesia may include the three molar teeth and the second bicuspid. Usually, however, it extends to and includes the first molar only, but frequently only part of that tooth is anesthetized. The anesthetized area includes the teeth mentioned, the alveolar process and the buccal membrane. The palatine area is not anesthetized by this injection since that area is innervated by the anterior palatine branch of Meckel's ganglion. To block this use the technic for the injection at the posterior palatine foramen.

Test for anesthesia.—To test for anesthesia prick the mucosa near the gum margin over the second molar tooth. The extent of anesthesia will be ascertained by the absence of pain upon pricking the gum, near the margin, over the teeth anterior to that mentioned.

INJECTION AT THE POSTERIOR PALATINE FORAMEN.

Synonyms.—Posterior palatine, anterior palatine, palatine canal, and posterior palatine foramen.

Object.—To reach and anesthetize the anterior palatine nerve as it emerges from the posterior palatine foramen.

Location.—The posterior palatine foramen lies above the third molar tooth at the junction of the alveolar process and the palate bone.

Preparation.—Use the solution left in the syringe from the preceding injection at the tuberosity, or if the solution has to be specially prepared for this injection, prepare it by the same method. Select a sterile needle twenty-five mm. long, of twenty-three gauge and equipped with a hub to fit the syringe used. The syringe best adapted to this injection is the two c. c. Record, the two c. c. Fischer, or the two c. c. Luer. Fill syringe with solution, invert so its point is upward, expel air bubbles, attach needle, and again expel air bubbles. Cleanse and paint the palatine mucous membrane near the three molar teeth with the iodine mixture.

Specific technic.—With the barrel of the syringe under the two bicuspid teeth of the opposite side, insert the needle into the palatine mucous membrane, five or six mm. above the free gum margin of the upper second molar tooth. Touch bone with the point of the needle, with the bevel of the needle toward the bone.

Release the point of the needle from the periosteum and swing the syringe to the opposite side (the side on which the injection is to be made) to such a position that the side of the needle nearly touches the first molar tooth. At this stage the needle and syringe should form an angle of nearly forty-five degrees with the plane of occlusion. Maintain the syringe at this angle and advance the needle along the bone and enter the posterior palatine foramen. About ten mm. of the needle should be in the tissue. At this point inject half a mil of one and a half per cent. procaine solution, taking at least half a minute to inject.

Test for Anesthesia.—Anesthesia occurs usually within three minutes, frequently it appears instantaneously. Test for anesthesia by pricking the palatine mucous membrane anterior to the injection. Anesthesia should be present as far forward as the first bicuspid tooth.

Nerve complications.—There are no nerve complications up to and including the second bicuspid tooth.

Accidents.—The needle may break, or it may puncture the vein, resulting in slight hematoma. It may be carried too far posteriorly, and in that case anesthesia of the soft palate will result with disagreeable hawking by the patient. Other accidents may occur in the same way as in injections at the tuberosity.

INJECTION AT THE INFRAORBITAL FORAMEN.

Synonyms.—Infraorbital foramen, infraorbital, anterior infraorbital, and anterior superior dental.

Object.—To reach the infraorbital foramen and, by diffusion, have the solution reach and anesthetize the anterior dental nerve.

Location.—The infraorbital foramen lies from eight to ten mm. below the infraorbital ridge in a line with the pupil of the eye, when looking directly forward, and the space between the two bicuspid teeth of the maxilla.

Preparation.—Prepare three mils of one and a half per cent. procaine solution; this quantity includes an excess of one and a half mils. To this quantity add one drop of suprarenal extract which is the equivalent of about one to 45,000. Select a sterile needle forty-two mm. long, of twenty-one gauge and equipped with a hub to fit the syringe. The syringe best adapted to this injection is either a two c. c. Record, a two c. c. Fischer, or a two c. c. Luer. Fill syringe with solution, invert so its point is upward, expel air bubbles, attach needle and again expel air bubbles. Palpate for and locate the infraorbital foramen. Touch the outer edge of the infraorbital ridge with the tip of the index finger, directly under the pupil of the eye when the patient is looking straight ahead. Drop the hand into such a position that it lies flat on the face. Under the centre of the finger nail usually lies the foramen. This foramen is distinguished by a depression between the malar process and a slight rise of bone on the median side. Frequently the bone is so flat that the foramen cannot be felt. Very often the foramen is so small that it is difficult to locate it. Hold the palpating finger lightly over the foramen. Lift the upper lip with another finger and hold it up out of the way. Paint the mucous membrane on the buccal surface and in the fold above the cuspid and the two bicuspid teeth with the iodine mixture.

Specific technic for the injection.—Insert the needle into the tissue at the highest point of the mucous fold, above the space between the two bicuspid teeth but about ten mm. away from the gum. Hold the syringe so that its barrel is in contact with the chin, with the mouth open. Point the needle so that it is in line with the middle of the foramen under the palpating finger. The bevel of the needle should be toward the bone, but do not touch the bone until the needle point shall have arrived at the foramen or just under it.

Advance the needle in the direction given, ejecting a small amount of solution just ahead of the needle, keeping away from bone. Hold the needle pointed at the middle of the foramen, with the barrel of the syringe as close to the chin as possible. Continue to advance the needle across the canine fossa. When about fifteen mm. of the needle is in the tissue begin to eject a larger drop of solution until the advancing needle and the ejected solution is felt under the palpating finger. Now, direct the needle into the foramen and advance until the needle strikes bone. This should be the overhanging top of the infraorbital foramen. Hold the palpating finger lightly over the foramen and the needle. Withdraw the needle about one mm. and inject, very slowly, one to one and a half mils of one and a half per cent. procaine solution. Take two minutes to inject this quantity. The needle may be kept moving slightly up and down during the injection. Withdraw the needle entirely from the tissue and see that it is in its proper place on the hub.

If it is suspected that the needle has not entered the foramen, massage the area and endeavor to carry the solution up to the foramen. Do this lightly; ecchymosis or black eye often results from rough massage. If, however, it is reasonably certain that the needle has entered into the foramen, simply hold the finger in position over the foramen, thus retaining the solution in the infraorbital canal where it was sent by the injection. Keep the finger in position lightly but firmly for about one minute. Anesthesia will appear in about fifteen minutes or less.

Test for anesthesia.—Anesthesia will be indicated by absence of pain upon pricking the mucous membrane above the anterior teeth. The extent of anesthesia may be described by testing the gum above the teeth as far back as the molars.

Nerve complications.—None except the anastomosis from the opposite side, which block by a similar injection on the opposite side or by infiltration.

Accidents.—The needle may break or it may pierce the muscles near the area, with infiltration of solution, resulting in soreness. The needle may puncture a vein, the blood exuding producing ecchymosis or black eye. Soreness, fainting, shock or collapse will follow the use of old, discolored, unclean or nonisotonic solutions, as in all injections, and infection and dangerous abscesses will follow the use of unclean instruments.

Remarks.—The resulting anesthesia will always include the three anterior teeth, the lip, the side of the nose, the lower eyelid, and the anterior portion of the maxilla. In about seventy-five per cent. of the cases, if the injection has been made within the foramen, anesthesia of the parts supplied by the middle and posterior superior dental nerves will result. Less often, the sphenopalatine or Meckel's ganglion will be anesthetized, resulting in a lack of sensation in the parts to which its branches go. All of this depends upon the excellence of the technic and the sure entrance of the needle into the foramen.

It has been discovered that the injection at the infraorbital foramen, made according to the technic in use heretofor, has simply been an infiltration process in which the needle usually arrived at the deepest part of the canine fossa.

This injection must not be held in too light esteem nor should one consider it with contempt. It is my opinion that this injection is the hardest and most difficult of all of the dental injections to do correctly. Under ordinary circumstances, it is well to make an injection at the anterior palatine foramen, in conjunction with the infraorbital, to anesthetize the palatal branches of the nasopalatine nerve.

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Early Diagnosis of Cancer of the Stomach

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The importance of an early diagnosis of gastric carcinoma has been thoroughly impressed upon us, and yet there is not another serious pathological condition in medicine so much neglected in differential diagnosis. Some have an idea that carcinoma of the stomach presents itself with an outburst of severe pain, vomiting, and palpable tumor, as I saw recently in a case of positive carcinoma. Another physician had refuted the suggestion of cancer on account of not finding a tumor and the patient not vomiting and prescribed medication for socalled indigestion. These symptoms are rather late in appearing and the patient is then probably in the inoperable stage. In regard to vomiting I should like to mention that this is a prominent though late symptom in carcinoma involving the pyloric end of the stomach when obstruction takes place. Should the involvement be anywhere else in the stomach there may be no vomiting at all, but nausea and slight regurgitation of gastric contents. Therefore do not depend upon it as a source of information.

Now what are the most reliable signs and symptoms or laboratory findings that will aid us in making an early diagnosis in gastric carcinoma? Truly speaking there are none at our command that will positively signify carcinoma, but there are a number of valuable signs and symptoms that will help us in making a diagnosis in most of the cases. I would rather make a diagnosis of carcinoma when it does not really exist than the reverse, as it does not endanger human life in any way.

The history of the case is most important. A careful history, allowing the patient to tell his own story, interjecting a question here and there, will uncover a multiple of facts whereby the prime factors towards a diagnosis will be reached. The first important factor in the history that can be easily brought out is the patient's age. We all know from study and clinical observation that the cancer age is at or above forty. As there is no rule in medicine this may have exceptions, but few cases of cancer of the stomach have been reported below twenty. In my own private practice I have seen one case of gastric carcinoma in a young male of twenty-eight, and three cases in persons between thirty and thirty-five, but these exceptions are in the minority and I presume most of us would be satisfied to make a faulty diagnosis only in these rare exceptions.

The second important factor that will be brought out in the history is the sudden onset. A patient of forty or more presents himself stating that up to three or four months ago he had been feeling well all the time except for constipation or some slight gastric disturbance, when he ate something that did not agree with him. As a rule they blame a certain food or meal as the beginning of their trouble. Since that time his stomach has been out of order, his appetite not the best or he has absolutely no desire for food. There has been loss of weight and strength, a lack of ambition, and he feels entirely out of sorts. In these cases always suspect gastric carcinoma, provided the patient has not had similar attacks within two or three years previous to this attack, as a similar condition may exist in patent cardiac end of esophagus with absence of cardiac sphincter. Anatomically speaking there is no special sphincter muscle at the cardioesophageal junction, but rather a thickening of the circular fibres of the esophagus acting as a sphincter.

In these conditions attacks of weakness, loss of appetite, loss of weight may occur every three or four years, and even an x ray examination will be interpreted as malignancy unless in the hands of a skillful röntgenologist, who will diagnose it correctly. I have to my credit one case in which I made a correct diagnosis after having to my discredit one of the same condition that I failed to diagnose correctly, labeling it carcinoma. However, I did better than the röntgenologist, who made a diagnosis of carcinoma in both cases.

I have referred to the sudden onset of gastric carcinoma, not including the colon in all its length, except probably the sigmoid and rectum, as cancer in the colon is a slowly progressing condition, is less malignant, and does not metastasize as rapidly as in the stomach. Cancer in the sigmoid or rectum is more rapid in its degeneration and more fatal than in the rest of the colon. Cancer of the esophagus has a sudden onset but its progress is slow. One of my patients succumbed to the disease two years after I made the original diagnosis of cancer of the esophagus.

Another very important etiological factor which aids in making an early diagnosis, and I may state here that a large percentage of gastric cancers follow this condition, is when a patient of forty or over tells us that he suffered in his earlier years from ulcer or gives a history or presents symptoms of ulcer of the stomach which cleared up, coming on occasionally in light attacks, but in the last attack he has not the appetite that he used to have in previous attacks and is losing weight and strength; in a case of that kind be on the lookout. In a recent article I pointed out the dangers of chronic ulcers undergoing malignant degeneration at the cancer age period.

Loss of weight in conjunction with the other signs and symptoms is significant, but more important is the sudden loss of strength for no apparent reason except what the patient believes to be slight gastroenteric disturbance. Sudden loss of appetite is a valuable symptom in conjunction with other conditions. Sometimes the desire for food is not much diminished at the beginning but requires only a small quantity of food to satisfy the hunger, and especially is this true in cases of chronic ulcers undergoing malignancy. Nausea is an early condition of no great significance.

Vomiting is rather late in appearing when obstruction takes place. When present it is of diagnostic importance and has to be differentiated from gastric obstruction due to cicatricial contraction of chronic ulcer. The treatment, however, is the same in both cases, viz., surgical. The vomitus may consist of gastric secretions, food particles, mucus, and food and blood, the socalled coffee ground material of textbooks. The last mentioned vomitus is a late result of breaking down carcinomatous tissue, and is a very valuable sign but late and cannot be included in the early signs of an early gastric carcinoma.

Anemia is not one of the earliest signs yet when present in conjunction with the other symptoms is very significant. Cachexia is a late symptom depending upon the anemia and cannot be looked for in the early stages of gastric carcinoma.

Pain is absent at the onset of the disease but some epigastric distress and discomfort exist and as the disease progresses there is epigastric pain. The pain is very marked in pyloric involvement and when obstruction takes place, hence not a very early symptom. In connection with this I wish to state that in pyloric obstructive cases there is generally a dilated stomach and profuse vomiting, the quantity of vomitus depending upon the amount of food taken. Bowel movements are usually sluggish. Diarrhea occurs only if a complication develops. Tumors in the epigastrium, irregular, hard and knotty and not moving with respiratory movements, are prominent evidence of gastric carcinoma. They occur late, however, and in some cases cannot be felt at all during the life of the patient, hence are not an early sign. Tumors in the epigastrium must be differentiated from benign, smooth tumors, such as cysts, distended gallbladder and hypertrophy of the pylorous, benign tumors of the stomach, pancreas and liver, such as cyst polypi, gummata, concretions and hydatids, also malignant tumors of the neighboring organs, such as pancreas, colon, liver and retroperitoneal lymph glands, although these, on the whole, are quite rare.

LABORATORY EXAMINATIONS IN EARLY GASTRIC CARCINOMA.

Test meals.—Where no obstruction takes place and carcinoma is not engrafted upon a previous chronic ulcer, we find diminished free hydrochloric and combined acids, diminished gastric secretions including ferments and enzymes. The presence of lactic acid depends upon stagnation of food in the stomach. As the disease progresses the free hydrochloric and combined acids are entirely absent as atrophic changes take place in the secreting mucosa. In obstructive cases we find diminished or absence of free hydrochloric and combined acids, lactic acid, Boas-Oppler bacilli, and sometimes blood. In malignant degeneration of ulcers there is, as a rule, at the beginning rather moderate free and combined hydrochloric acid and no lactic acid unless obstruction takes place. Hence the examination of gastric contents or vomitus in early stages of gastric carcinoma does not reveal or aid as much as was formerly thought in early diagnosis of early carcinoma of the stomach. A very high free hydrochloric acid, however, excludes carcinoma of the stomach.

Wolff-Junghaus reaction.—This is an increase in the soluble proteins of gastric contents to a higher dilution. It is a worth while procedure and the presence of a positive reaction is significant. The reagent is the following:

Phosphotungstic acid	0.30 gm.
Concentrated hydrochloric acid	1.00 gm.
Alcohol, 96 per cent	20.00 c. c.
Aqua dist., ad	200.00 c. c.

TECHNIC.

Let the patient have a light meal the evening preceding the examination. On the morning of examination give him an Ewald test breakfast and extract it within three quarters of one hour after ingestion; filter contents until clear. Have six clean test tubes, by means of one c. c. pipette graduated to one one hundredth marks; place in each tube, respectively, one c. c., one half c. c., one quarter c. c., one tenth c. c., one twentieth c. c., one fortieth c. c., etc. Make up volume in each test tube to ten c. c. by adding distilled water and mix thoroughly. Overlay each test tube with one c. c. of reagent and a white ring will appear at point of contact. Normally a distinct ring of albumin precipitated will be seen on dilution of one tenth, one twentieth and occasionally one fortieth. In carcinoma the albumin precipitation is greater to higher dilution, viz., one one hundredth, one two hundredth and sometimes even higher.

The finding of occult blood in the fecal matter is very helpful, but as it occurs rather late, it cannot be considered as an early sign. When present in the stools it has to be differentiated from gastric ulcer. The blood examination, as a whole, does not reveal much, yet it is advisable to examine it and in conjunction with the other above mentioned data may aid in coming to some conclusion. The blood count in early cases is not significant, except probably for secondary chlorotic anemia. The color index is low, nucleated red cells of the normoblast type are found, with relative polycythemia, hyperleucocytosis and a comparative increase in neutrophiles. There is an increase of the sugar content of the serum. Abderhalden reaction, when present, is not significant *per se,* but in conjunction with the other findings is corroborative.

It has been shown by Weil that the blood serum of cancer patients frequently contains hemolysins, which are destructive of normal noncancerous corpuscles, while the patient's own corpuscles are more or less resistant. Compliment fixation is positive in about fifty-seven per cent. of cancer cases, but the occurrence of the same reaction in syphilis has rendered this valueless.

Concerning the urine, there is a diminished output of chlorides, nitrogen catabolism is increased, the elimination of ammonia is at the same time relatively high, and there is marked indicanuria.

At the very early onset of gastric carcinoma very little aid may be expected from x ray and fluoroscopy, but in the early moderate or advanced cases the x ray will decide the diagnosis. Finally as a last resort and very instructive is an exploratory laparotomy.

CONCLUSIONS.

While there is not any one definite, specific sign, symptom or other means whereby we can make a positive early diagnosis in an early gastric malignancy, yet considering a number of these findings in a group will help us to diagnose an early gastric cancer in a majority of cases. The following are of importance to be noted: 1, Age, forty or above; 2, sudden onset; 3, history of chronic gastric ulcer; 4, anorexia; 5, loss of weight; 6, loss of strength; 7, anemia; 8, cachexia; 9, palpable tumor, when present most important; 10, pain in gastric region; 11, vomiting and character of vomitus; 12, gastric contents examined at different times for free hydrochloric acid, combined acids, lactic acid, ferments and enzymes, Boas-Oppler bacilli, blood, soluble proteins, and sometimes there is found carcinomatous tissue in advanced cases; 13, fecal examination; 14, blood examinations for enemia, isohemolysins, sugar, Abderhalden reaction, and complement fixation; 15, x ray; 16, laparotomy.

616 Madison Avenue.

Etiology and Treatment of High Blood Pressure, Arterial Hypertension, and Arteriosclerosis

By GEORGE EDWARD BARNES, M. D.,
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(Concluded from page 77)

Article C first considers the inflammatory theory of the origin of arteriosclerosis and states that the leucocytosis in the early lesions of the intima indicates some possible truth in this theory. However, injury to the tissues caused by excessive contraction or dilatation could produce such slight leucocytosis.

The next theory considered is the mechanical theory which the author says was made prominent by Thoma's famous work on the origin of the arteriosclerotic thickening of the intima. Thoma has recently formulated these statements: "The growth of the transverse diameter, or of the circumference of the lumen of a bloodvessel depends upon the rapidity of the blood stream. * * * Negative growth, a decrease in the circumference of a bloodvessel, occurs when the velocity of the layers of blood flowing close to the vessel wall decreases below the threshold value," by which latter term he means essentially the usual normal velocity. He holds that when the arteries thus decrease in size there takes place a local or a general giving way of their walls and that thickenings in these bulging places are produced to restore the preexisting calibre of the arteries. Certainly Thoma has a grotesque idea of the cause of the variations in the calibre of the arteries and his ideas are all essentially fanciful.

Other writers on this mechanical theory say that arteriosclerosis is due to physical stress acting upon the arterial walls and to chronic high blood pressure. Stress is an indefinite term. For a long time past and by most medical authors today there has been thought to be causal relation between high blood pressure and arteriosclerosis. Indeed, like many other authors, the author of article B apparently seems to consider high blood pressure and arteriosclerosis as very much akin either in nature or etiology. However, the author of article C and some other authors do not think that high blood pressure is a cause of arteriosclerosis because there are cases in which high blood pressure persists for many years without leading to arteriosclerosis. Personally I have not yet reached a full conclusion on this subject. There may be cases of high blood pressure continuing for an unusually long time without arteriosclerosis but they are probably the exception. It seems reasonable to consider high blood pressure in itself one cause of arteriosclerosis because the high intraarterial pressure must compress the arterial walls and diminish their nutrition. However, we must not forget that with high blood pressure there is often associated undue contraction or dilatation of the arteries and we must take the effects of these latter conditions into consideration when tracing the causation of arteriosclerosis. High blood pressure accompanying dilatation of the arteries may stretch the arteries beyond the limits of the relaxation and thus add to the arteriosclerosis.

(Although article C does not go into the consideration of the causation of high blood pressure, we find on pages 9 and 96 (11) an expression of the author's opinion on this important subject. He says that high blood pressure is largely due to functional disturbances in the arteries, probably an increased tonicity in the small arteries and arterioles. We have already discussed this theory and found it not correct.)

Our author states that adrenalin injected intravenously into rabbits causes a condition similar to arteriosclerosis but he rejects this evidence on the causation of arteriosclerosis because the condition produced by adrenalin does not seem to be exactly the same as the lesions of arteriosclerosis. I have not seen these experimental lesions in rabbits but if they are caused by adrenalin and are like arteriosclerosis I am not at all certain that this evidence should be so summarily cast aside, for, as already indicated, I consider that continued contraction of the arteries, from whatever cause, will produce arteriosclerosis in human beings.

The author of article C devotes a great part of his discourse to presenting his findings in his personal investigation into the possible causal relation between the various infections and arteriosclerosis. His conclusions (p. 95) are:

"1. The development of arteriosclerosis is closely connected with injury to the arteries resulting from various infections.

2. Chronic septic infections of the rheumatic type seem to play the most important role in this connection.

3. The arterial lesions seem to reach their full development after the active infectious process has long subsided.

6. Syphilis is of great importance in the production of disease of the aorta and of the cerebral arteries. Its etiological importance in arterial disease elsewhere in the body is still undetermined but does not appear to be very pronounced.

7. The tissue changes in arteriosclerosis are partly inflammatory but to a great extent degenerative and reparatory. In the arterioles the initial lesion seems to be a lateral subendothelial hyaline thrombosis followed by organization; in the larger arteries we find evidence of endothelial damage permitting the entrance into the intima of blood plasma and blood cells, followed by proliferation and degeneration.

8. General arteriosclerosis is sometimes, but by no means always, associated with hypertension."

I wish first to call attention to the fact that the author does not positively declare that arteriosclerosis is caused by injury to the arteries resulting from various infections. Still he believes (p. 35) that he has presented "convincing proof" "of the overwhelming importance of chronic septic conditions in the development of general arteriosclerosis." However, he merely finds evidence of former infections more frequently in cadavers showing arteriosclerosis than in cadavers not showing arteriosclerosis. I wish particularly to call attention to his conclusion number three stated above and to his statement on page 36 that at the time of observing cases of arteriosclerosis the foci of infection, if found, are practically always extinct. Here is an important point: affective activity (which I consider to be the chief ultimate cause of arteriosclerosis) by producing a dilatation or a contraction of the bloodvessels, particularly of the arteries and capillaries, often causes all the tissues of the body to receive an insufficient supply of blood and therefore the tissues in such cases, particularly the tissues most prone to chronic infections, more frequently become infected than do the tissues in cases not disturbed by such affective activities. In other words, the more prevalent infections found by the author are an incident occurring with the arteriosclerosis or rather they may be considered to be the result of the same affective disturbance which causes the arteriosclerosis. (This relation between blood supply and infection is a very familiar one in surgical practice but seems to be scarcely realized in medical practice.) The very fact that our author pursued an investigation essentially on cadavers instead of on living persons through a course of years denied him the possibility of investigating such immensely important things as affective disturbances, which cause probably more than half of all ailments of living human beings.

The author says that it is exceedingly difficult to explain why at the time of investigating his cases of arteriosclerosis their foci of infection were found to have been long inactive and he believes that after the infections have once injured the arteries the lesions in the arteries continue to develop independently of the septic process. While such a thing may be within possibility it seems hardly probable unless the injury is very severe. Does pathological investigation show that the supposed initial injury caused by infection is so great that the lesion would continue to develop as arteriosclerosis does? I doubt it. On the other hand, one of the most marked characteristics of severe affective disturbances is the persistence with which they continue many years and they usually begin in impressionable adolescence or early middle life and not rarely in youth and even childhood. If infections cause such an extensive disease as arteriosclerosis why do they not affect all other tissues of the body in a similar manner? It has not been shown that these infections have a predilection for the arteries. Indeed, the author himself declares (p. 14 in two places) that the arterial walls seem to be very resistant to septic infection!

As I showed quite thoroughly in my article on neurocirculatory asthenia (5), the arteries are frequently tightened up by the irritable condition of the sympathetic or thoracolumbar nervous system during convalescence from almost any severe disease, *infectious diseases included,* and in such cases long continued contraction of the arteries would lead to arteriosclerosis. In such cases also the heart is somewhat weak. In consequence the blood supply to the tissues is poor and infection is frequent.

Here is another method by which infections may indirectly lead to arteriosclerosis through their effects on the nervous system. Certain infections during the stage of activity tend to stimulate the vagus nerve and other infections tend to stimulate the thoracolumbar or sympathetic nervous system, the former causing relaxation and the latter causing contraction of the arteries. This may be seen in two cases of pneumonia. Both conditions would conduce, if continued long enough, to arteriosclerosis. However, it is probable that this process does not occur very often because such disturbances are probably not of very long duration, especially in this day of surgical pursuit of foci of infection.

I wish to congratulate the author of article C on not even once mentioning intestinal autointoxication in the report of his most extensive investigation into the causation of arteriosclerosis, and to similarly congratulate the author of article A.

The author in conclusion number six speaks essentially of local disease in the arteries caused by syphilis and says that although he finds evidence of this in the aorta and cerebral arteries he has not found proof of it in other arteries. On pages 24-5 he says: "The belief that chronic syphilis is an important cause of generalized arteriosclerosis is . . . widely prevalent and has again been expressed in no uncertain terms by several authors recently on the basis of general impressions or as a result of a study of the histories of such patients, but I fail to find anywhere a conclusive proof of this contention."

The treatment of tight arteries will be found in my article on Neurocirculatory Asthenia (4). This very prevalent condition is still essentially universally unknown and I have heard of eminent men in the profession who have denied its existence! Contracted arteries are usually diagnosed (!) as weak heart and strychnine is the drug usually prescribed although it aggravates the condition! As a matter of fact the heart is usually in quite good or fair condition and needs little or no direct medicinal treatment, the treatment of the arteries benefiting the heart. The regulation of exercise and rest is of great importance, the patients feeling being a safe guide.

Dilated arteries and an accompanying heart of lowered rate, lowered tonicity, and lowered force of contraction require such drugs as digitalis and its relatives, belladonna, scutellarin, valerian, strychnine, arnica, and other drugs. Both arteries and heart are directly or indirectly affected by these drugs when they are needed. By the way, valerian is used in medical practice as a sedative but I have found it to be a stimulant and have used it as such for many years. The same point applies to scutellarin and viburnum prunifolium.

When both pathetic and violent affectivity simultaneously activate their respective division of the vegetative nervous system, as shown by the dilated arteries and high blood pressure (the latter resulting from increased force of heart action), the treatment is particularly difficult and consists in the judiciously combined use of the above indicated sedatives and stimulants, great care being taken not to make the patient feel weak.

An affectively stimulated heart is controlled by the sedatives above indicated. Phosphorus, with caution, is indicated, and psychotherapy should be used as indicated. Environment often needs modification.

Proper regulation of mental and physical rest and exercise for each particular case of affective disturbance is important. Although confinement to bed, the Weir Mitchell rest cure, is still in vogue, I consider such an extreme method of immobilization which weakens even the bones as very objectionable except in very rare and extreme cases. Most patients are better off if they dress so that they can move about frequently a little and they should have a comfortable lounge on which they may recline most of the time or as much as needed. Exercise which partakes of the nature of light work is best because most interesting and natural and may be given first, when necessary, with patient sitting or even reclining.

Baths, in ordinary city water, in frequency and kind to suit the case, warm for relaxation and cool for stimulation, are valuable and sometimes important adjuvants to the medicinal treatment, particularly in causing the arteries to relax sufficiently for sleep. Of course, any arteriosclerotic changes that have already taken place cannot be remedied.

A factor in the causation of arteriosclerosis which I have not mentioned above and which I have never seen or heard of elsewhere is the insufficient activity of the thyroid gland, this insufficiency causing the arteries to become more vulnerable and brittle. There is no doubt that lack of thyroid activity has this effect on some of the tissues of the body, and such condition, of course, calls for thyroid extract or iodine. Many a case bothered by frequent cracks or fissures (nonsyphilitic) of the anus or lips may, while the lesions are recent, be cured by thyroid extract or by iodine. The proneness of fat people to arteriosclerosis on account of the tight arteries caused by their greater effort in going about and working may perhaps be increased in occasional cases by insufficient activity of the thyroid or other gland.

Although there is a very prevalent idea in the profession that nothing can be done for socalled nervous cases or nerves, it should in conclusion be most emphatically stated that very much more can be done for these affective disturbances than can be done for any other large group of ailments. Indeed, it is safe to say that half the cases that medical men have to treat are distinctively affective and that whatever ailment a human being has, whether medical or surgical, his accompanying affective condition shall be thought of and treated if necessary.

REFERENCES.

1. Barnes, George Edward: Affective Activity, Emotions as the Cause of Various Neurasthenic Bodily Diseases, New York Medical Journal, April 4, 1914.

2. *Idem:* The Rationale of Neurasthenia and Disturbances of Arterial Tension, *Boston Medical and Surgical Journal*, October 18, 1917.

3. *Idem:* The Etiology of Disturbances of the Heart Beat, *Boston Medical and Surgical Journal*, October 25, 1917.

4. *Idem:* The Explanation and Treatment of the Effort Syndrome, Neurocirculatory Asthenia, (Soldiers') Irritable Heart, *Medical Record*, July 26, 1919.

5. *Idem:* How to Palpate Arteries to Determine Arterial Tension and Blood Pressure, *American Medicine*, December, 1921.

Tumors of the Heart

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(*Concluded from page 101*)

Lorne's patient was a woman aged sixty-eight. The tumor in the heart was a myxoma. Bamberger, Bostrom, Virchow, Pavlowsky, Thompson and Atchison, Curtis (1872), Debove (1873), Losen (1886), Czapek (1891), Jaegers, Robin, Suth (1898), Ribbert (1904), Leonhardt (1905), Baumeister (1906), and Hagedorn (1908) reported myxoma of the heart.

Bacquoy (1866) reported a case of cancer of the heart in a girl aged twenty-four. Prudhomme's (1867) case was a melanocarcinoma of the heart in a man.

Primary tumors of the heart were also reported by Luschka (fibroma, 1857), Billard (carcinoma (?) 1828), Segalas d'Etehepare (1825, carcinoma), Ollivier (1837, carcinoma), Paikert (1865, carcinoma), Kantzow and Virchow (1866, myoma), Wagstaffe (1871), Hartill (1886, fibroma), Handfort (1887, lipoma), Hennig (1888, spindle celled sarcoma) and Andale and Bayle (1824, carcinoma).

Otto Napp, in his brief remarks on Secondary Cardiac Tumors, says, "*Virchow hat auf das Gesetz aufmerksam gemacht, dass diejeniger Organe, welche zu Primärtumoren neigen, selten Metastasen entwickeln und umgekehrt. So wird auch, während primäre Geschwülste des Herzens nicht zu den häufigsten Vorkommnissen gehören, das auftreten von sekundären Tumoren öfters beobachtet.*" He mentions Deguy's three cases of secondary tumors of the heart, two of which were melanosarcomata, and those reported by Wagner, Friedreich, Lister, Simon, Leroux, and Meslay, also Lenoble, Cruveilhier, Labrie and Penleve (the last four being secondary cancers of the heart), and concludes by recording several secondary cardiac tumors occurring at the *Invalidenhaus and pathologischen Institut des Krankenhauses am Friedrichshain zu Berlin.*

Thacher's specimen of sarcoma of the heart was taken from a man, aged fifty-nine years. He suffered from dyspnea, palpitation of the heart and vertigo, edema of the feet, loss of weight, and some pain in the abdomen, chest and left shoulder. The tumor, three by two by two and a half inches, was found in the wall of the left auricle (small round celled sarcoma).

Loomis (May 25, 1892) presented a specimen of a diffuse infiltrating sarcoma of the heart from a single woman, aged twenty-five—before the New York Pathological Society. The heart was secondarily involved from the rapidly infiltrating round celled sarcoma in the breast. He says, "sarcoma of the heart, even as a secondary affection, is a rare condition, and when it occurs it is generally circumscribed."

Oswald Hagedorn (1908) reviewed the literature, and collected forty-six tumors (primary) of the heart—six myomas, one angioma, one cavernous tumor, twenty-nine myxomata, six lipomas, two sarcomas and one indefinite primary cardiac tumor and adds the reports of two cases of primary tumors of the heart, that occurred in the *Pathologischen Institut des Krankenhauses* (Hanover).

Binder (36) (1914), in his report of a case of primary round celled sarcoma of the heart occurring in a man aged thirty-three years, reviews the literature briefly and gives twenty references.

Carl Sternberg (37), Brünn (1910), showed a specimen of a primary spindle celled sarcoma of the heart from a man aged fifty-one years. The clinical diagnosis was myocarditis.

Jacobson in his dissertation (Königsberg, 1911) reviews the literature on primary tumors of the heart and reports a case of myxoma (angioelastomyxoma) of the heart in a woman aged fifty-three. He refers to the cases reported by Jacobsthal (fibromyxoma in a four year old child), Ribbert, Henke, Boret, Virchow, Albers (first case of primary cardiac tumor, 1835) and others.

Fritz Fuhrmann in his dissertation (Marburg, 1899) reviews the literature, with abstracts of thirty-six cases, including three cases which he reports—one a primary spindle celled sarcoma of aortic valve in a seven year old girl, the second a myxoma in a man aged thirty-seven, and the third, a large spindle celled sarcoma (Justi). Under fibroma he has cases reported by Luschka, Kottmeyer, Wagstaffe, Zander, Waldvogel, Juergens and Albers. Under lipoma he collected cases reported by Albers, Banti, and Petrocchi. Under sarcoma of the heart, he collected the cases reported by Bodenheimer, Hottenroth, Ely, Birch-Hirschfeld, Fränkel, Juergens, Weiss and Prudhomme. Under myxoma he reviews the cases reported by Curtis, Von Bamberger, Wigandt, Salvioli, Boström, Virchow, Juergens, Berthenson, Robin, Guth, Lorue and Martinotti. As doubtful cases he mentions those reported by Andral Locher and Moxon (Hydatid cyst, obliterating by its presence the coronary sinus, 1871).

Nathan Raw (October 29, 1898), of Liverpool, reported a case of fibrosarcoma of the right auricle of the heart (primary) in a stout, muscular, well-nourished charwoman aged forty-three, who was a patient in the Mill Road Infirmary.

At a meeting of the Biologic Section of the Physicians' Association of Hamburg, February 26, 1901, Simmonds showed a primary cardiac tumor (?) in a twenty-five year old phthisical patient. Fränkel showed a mixed giant celled sarcoma of the right ventricle and stated that there were fifty cases of primary cardiac tumor in the literature.

Laisney in his Thesis (1895, Paris) reviews the literature on cancer of the heart and collected thirty-eight cases and gives thirty-six references to the literature. He mentions probable cases of cancer of the heart that were reported in 1767, 1777, and 1844. He gives abstracts of all the reported cases, of cancer of the heart, including Hayem's, Bucquoy's, Souville's, Proust's, Barthelemy's, Emeric Smith's (1840), Nicereau's (1868), Campana's (1859) and Latham Ormerode's (1847) cases and the cases reported by Cruveilhier (1837), Francis (1867), Aran (1846), Andral and Bayle (1824), Hewett (1847) and (1848), Fere (1880), Laennec, Cohn (1853), Paget, Sims (1833), Doleris, Brunon, Forster, Regnault, Letulle, Labric (1851), Segalas d'Etchepare (1825), Billard (1828), Prudhomme (1867), Andral (1874), Kink (1843) and Ollivier and a few others.

Norman Moore (38) reported three cases of metastic carcinoma of the heart. 1. A man aged forty-one, had a (primary) cancer in the right kidney, with metastases to the heart (wall of left ventricle) and lungs. 2. A man aged fifty-seven, with cancer of the esophagus (primary) and metastases to the (wall of right ventricle) heart, pleura, liver, kidney, suprarenals and lumbar glands. 3. A woman aged sixty-four, who had cancers in the skin (primary) and metastases to the lungs, pleura, peritoneum, spleen, kidneys, and glands. The heart contained many masses of the new growth and there were some in the pericardium.

Arthur Voelcker (39) reported a case of extensive metastatic deposits of carcinoma in the heart, in a woman aged sixty-one. During life there were no abnormal heart sounds. A large nodule of growth was present at the base of the papillary muscles in the right ventricle. Several smaller nodules were found in the walls and on the surface of the left ventricle and auricle. The primary growth was at the pyloric end of the stomach.

Ludwig Hektoen (as stated) presented three specimens of tumors of the heart before the Chicago Pathological Society, October 10, 1893. Dr. Hektoen (40) reports these cases, and refers to Tedeschi's (1893) review and the papers by Martinotti (1886) and Pil and Bret (1891). Hektoen was able to collect 110 instances of tumors of the heart, and states that "tumors of the heart are among the rarest of conditions. The majority of cardiac neoplasms are secondary, consequently, as a rule, either carcinomatous or sarcomatous, the first being the more frequent." His own cases were, 1, medullary carcinoma of the breast in a woman aged fifty years, who had a metastatic nodule in the wall of the right ventricle. 2. Spindle celled osteosarcoma of the tibia in a boy aged twelve, having sarcomatous metastasis in the right ventricle, and, 3, a primary round celled sarcoma of the epicardium of the anterior surface of the ventricles in an Indian woman aged fifty.

Lambert's (41) case of primary small round celled sarcoma occurred in a man aged thirty-nine years. Dr. Harman Brooks performed the autopsy. Extensive tumor growth was present in the wall of the left ventricle, and the pericardium.

Peters and Milne (42) report three cases of secondary tumors of the heart. 1. A case of carcinoma of the rectum in a man aged forty years with metastatic growths in the heart and lungs and liver. 2. Carcinoma of the pylorus with secondary involvement of the heart, liver and mesenteric glands in a man aged sixty-eight. 3. Mediastinal lymphosarcoma with involvement of the pericardium and heart in a man aged thirty-six.

Monckeberg, before the *Medizinische Gesellschaft* in Giessen, January 26, 1909, reported his (see above) case in a woman aged sixty with high grade coronary sclerosis and tumor of the heart.

PRIMARY SARCOMA OF THE HEART WITH METASTASES TO LUNGS AND PANCREAS.

The following is from the autopsy records (5875-1918-111) of the University of Pennsylvania. Vol. XXX, pp. 372-374. The date of the autopsy was August 5, 1918. The patient was from the service of Dr. Charles Potts, Blockley Hospital, Philadelphia. The autopsy was performed by Dr. Graf. (The sections were examined at my request by Professor Allen J. Smith, of the University of Pennsylvania, and he found sarcoma in the pancreas, heart, and lungs.)

The patient, J. A., was admitted to the hospital July 15, 1918, and died August 3, 1918. The clinical diagnosis was polioencephalitis, arteriosclerosis, and Bell's facial palsy. The histological diagnosis was secondary sarcoma (small cell polymorphous) of lung; primary small cell (polymorphous) sarcoma of heart; secondary sarcoma of pancreas; chronic interstitial nephritis; chronic interstitial splenitis. The gross anatomical diagnosis was, chronic adhesive pleuritis with effusion in left pleural cavity; chronic adhesive pleurisy of right lung; hemopericardium thickening of right ventricle wall (tumor) with parenchymatous degeneration of left ventricular wall; congestion of lungs with nodular (new growths); interstitial splenitis with increase of splenic tissue; right chronic interstitial nephritis with cystic degeneration; left chronic interstitial nephritis with parenchymatous degeneration; lobular cirrhosis; edema of brain; secondary tumors of the pancreas. There were some firm nodular areas in pancreas—probably new growths.

AUTOPSY REPORT.

The body is that of an adult emaciated male of about fifty years of age. The hair is fairly abundant and grayish; teeth in upper jaw absent, two gold crowns in lower jaw. The abdomen is scaphoid and green, abdominal muscle is scanty, abdominal cavity shows nothing abnormal except omentum and abdominal fat is lacking. Left pleural cavity contains 300 c. c. of blood tinged fluid, several firm adhesions posteriorly and to diaphragm; right lung has less extensive adhesion and pleural cavity is free from fluid; pericardium contains about 450 c. c. of blood tinged fluid.

The heart weighs 320 gms.; small in size and flabby; on the right ventricle and extending to pulmonary leaflets is a thick area dark bluish green and firm in consistency. Upon opening the right ventricle the area described is much thicker than the rest of the wall, measuring 1.5 cm. in width, while the wall at the apex is 5 cm. The pulmonary and tricuspid valves are apparently normal. The aortic leaflets are normal, but at the base of the aorta there is extensive atheromatous change; the wall of the left ventricle is soft and the muscle pale, with several dark areas, possibly postmortem changes. The mitral valve is normal in appearance and width.

The left lung weighs 450 gm.; shows nothing but congestion, excepting for a few places in the lower lobe where several areas about 2 cm. in diameter stand out primarily, firm, and of reddish color. The right lung weighs 500 gms.; likewise shows the same kind of lesions.

The spleen weighs 200 gms.; enlarged, dark in color, capsule wrinkled, firm in consistency; on section pulp is very dark and smooth, but surface glistening and watery. The suprarenals show extensive discoloration; otherwise normal.

The left kidney weighs 150 gms.; average size, dark in color and shows clear wall cysts on surface. On section cysts are seen to be filled with clear straw fluid; one of the cysts is about 2 cm. in diameter. Kidney pyramids slightly paler than cortex; capsule strips with increased resistance and leaves a very granular surface, and near hilum tears in substance. The right kidney weighs 110 gms.; smaller in size, much paler in color, it has several small cysts projecting on surface. Cut section shows cortex apparently increased in width and softer than the left. The capsule strips readily, leaving rather a corrugated surface. The ureters and bladder were normal.

There was nothing abnormal in the stomach, duodenum and intestines. The pancreas was normal in size, very dark in color, several firm nodular areas. An incision or areas showed red, smooth, finely granular surface with distinct appearance and outline and pancreatic tissue. The liver weighs 1,020 gms.; probably undersized, capsule bluish green in color, smooth probably postmortem condition. On section it was rather granular and firm. The greater portion of the liver was discolored.

The brain weighs 1,360 gms.; dura adherent to skull, considerable edema of gelatinous type in pia and arachnoid; excess of fluid at base; bloodvessels at base show atheromatous changes. Sections were prepared and examined histologically from the heart, lung, spleen, liver, kidney, and pancreas.

The epicardium is of usual thickness and with its underlying fat is infiltrated with a mass composed principally of cells of a sarcomatous nature. These cells are of various sizes some being large others small, mononuclear and having a pinkish protoplasm. An occasional spindle cell is noticed. There is considerable fibrinous intercellular substance present in the infiltration. A small amount of connective tissue is also present; endocardium not shown. Comparatively little muscle tissue is present, greater part having been replaced by the infiltration described. Remaining muscle fibres are narrow, faintly striated and have poorly stained nuclei. Larger bloodvessels are somewhat sclerosed.

Pleura somewhat thickened, slightly roughened, congested, and shows considerable leucocytic infiltration. Alveoli contain considerable œdematous material, a few red blood cells, an occasional leucocyte, and desquamated epithelial cell. Areas of infiltration similar to those described in the heart are seen scattered through the lung. The cells are very large. An occasional area shows some central necrosis. The larger bloodvessels are distended.

The capsule of spleen is smooth and somewhat thickened as also are the trabeculæ; follicles are somewhat smaller than usual in some areas, and contain some excess of degenerated red blood cells; pulp tissue contains considerable degenerated blood and relatively little of the usual cellular elements.

The liver capsule is smooth and very slightly thickened. There is a moderate increase of the interlobular connective tissue with replacement of some of the peripheral liver cells. A considerable amount of fat is also present in the peripheral cells of the lobules. Liver cells for the most part are somewhat swollen and granular but stain well and contain clearly stained nuclei. Some lobules show a moderate amount of congestion with beginning degeneration of the cells around the central vein. The bile ducts appear normal.

The renal capsule is roughened, somewhat thickened and infiltrated with round cells; glomeruli are small, congested, showing varying degrees of fibrosis. Some are completely scarred; tubules are lined with flattened, granular, degenerated, pale staining epithelial cells; lumens of tubules contain desquamated epithelial cells. There is considerable increase of intertubular connective tissue which in areas has compressed and replaced the tubules; medulla contains an excess of connective tissue which is compressing the straight tubules which are lined by flattened and degenerated epithelium. A few hyaline casts are noticed. A second section does not show a marked fibrosis as preceding section; tubules and glomeruli are much degenerated. An occasional cyst filled with pink homogeneous material is seen. Section of medulla not shown; larger bloodvessels somewhat sclerosed.

There is very little recognizable pancreatic tissue present. Where seen it shows marked fibrosis, the acini being compressed by the increased connective tissue; cells of the acini are small, granular, and poorly stained. Only occasionally are any islands of Langerhans present, which are much degenerated; greater part of section shows mass composed of an abundance of varying sized lymphoid cells in a reticulum of fibrin and connective tissue. Some areas of the mass show caseous appearing degenerations. A second section was unlike the preceding section.

SECONDARY MELANOTIC SARCOMA OF HEART, SPLEEN, AND THYROID.

Case I.—University of Pennsylvania autopsy records, 1913, 62 (4177); vol. xxv. Service of Dr. Henry. Autopsy performed by Dr. Lynch, Blockley Hospital. E. F., aged fifty-four. Died April 27, 1913. Secondary sarcoma of heart, spleen, thyroid, kidney, pancreas, small intestine, and liver. Extensive metastases. Metastatic melanotic sarcoma of skin, bones, lymph nodes, serous membranes, gall bladder, urinary bladder, and right orbital tissue. (Enucleation right eye.) The heart showed secondary sarcoma of endocardium, epicardium, and myocardium.

SECONDARY LYMPHOSARCOMA OF THE HEART AND LIVER.

Case II.—University of Pennsylvania autopsy records, 362, 1904, 299, pp. 501-505, vol. x. (Museum specimen 204, 206, 207, 208.) Autopsy by Dr. A. J. Smith. Abraham Mafford, Blockley Hospital, March 4, 1905. The patient was aged seventy. Admitted December 26, 1904. Died December 28, 1904. Lymphosarcoma of lymph glands, hypertrophy of heart and small islands of lymphosarcoma, slight cirrhosis and congestion and lymphosarcoma extension of liver and chronic parenchymatous nephritis. General involvement of mesenteric, retroperitoneal and right axillary lymph nodes.

SECONDARY MELANOTIC SARCOMA OF THE HEART, LUNG, AND INTESTINE.

CASE III.—Blockley Hospital, 286, 1904, 182. John Barceland, aged sixty-five. Service of Dr. David Riesman and Dr. Hearn. Autopsy by Dr. A. J. Smith. Report by Dr. Alburger. University of Pennsylvania autopsy records, vol x, 1904, pp. 270-275. Admitted to hospital May 26, 1904. Died July 15, 1904. Secondary large spindle celled sarcoma of lung, intestine, lymph nodes, heart, and adrenals. The tumor is a large spindle celled melanotic sarcoma, involving the retroperitoneal and mesenteric lymph nodes, liver, large and small intestines, and mesentery.

METASTATIC LARGE ROUND CELLED SARCOMA OF THE HEART, LUNGS, SPLEEN.

CASE IV.—University of Pennsylvania autopsy records, pp. 70-75; 3570, 1911, 18, vol. xxii. Mrs. C. (Dr. Allyn), April 7, 1911. (Private patient.) Autopsy by Dr. Karsner. Pigmented soft mole of the labium majus; metastatic large round cell sarcoma of heart, lungs, liver, spleen, pancreas, kidney, adrenals, and lymph nodes. The heart shows no tumor in parietal pericardium whatever. The epicardium shows in the right auriculoventricular groove two nodules one cm. in diameter, one of which is pigmented and the other not. At the apex, to the left of the ventricular groove, is a small slightly pigmented nodule. Over the right auricle posteriorly is a nodule, moderately pigmented, five mm. in diameter. Embedded in the substance of the left ventricular wall are numerous nodules three to four mm. in diameter, some pigmented.

METASTATIC SPINDLE CELLED SARCOMA OF THE HEART AND LUNG.

CASE V.—University of Pennsylvania pathological records, 3607, 1911, 50, vol. xxii., pp. 179-183. Admitted to hospital March 3, 1911. Died March 24, 1911. E. W., May 24, 1911, Blockley Hospital, aged fifty-five, negress. Autopsy by Dr. H. T. Karsner. Spindle cell osteosarcoma of femur with metastases to the heart and lung; chronic interstitial splenitis; chronic interstitial nephritis; cloudy swelling of liver. The heart weight was 375 gms., small, firm and brown. In the auriculoventricular growth of the junction of the posterior margin of the septum is a tumor nodule, measuring 3 by 1 by 0.5 cm. sharply defined and involving the muscle of the left ventricular wall to the depth of twelve mm., leaflets and chordæ tendinæ, and papillary apices are markedly sclerosed; foramen ovale is closed; endocardium slightly thickened in the left ventricle.

SECONDARY SMALL ROUND CELLED SARCOMA OF THE HEART AND PANCREAS.

CASE VI.—Blockley Hospital, 3952, 1912, 87, August 15, 1912. University of Pennsylvania autopsy records, vol xxiv, pp. 327-329. James Loughman, aged twenty-nine, white, male. Brown atrophy with secondary sarcoma of heart; small round cell sarcoma of neck; metastasis to pancreas. Service of Dr. Alfred C. Wood. Autopsy performed by Terrill and Keilty. The patient was admitted to the hospital June 17, 1912. Died June 25, 1912. Sarcoma of the neck (small round cell). The heart small, scant epicardial fat. Myocardium is pale, brownish red, firm; endocardium apparently normal valves; mitral valve thickened at the edge; pericardium normal. In the heart muscle there is rather a diffuse amount of dark brown pigment. The muscle fibres are atrophied, nuclei shriveled. About one of the larger blood vessels was found a collection of small round cells, which have the same distinctive type as the cells in the tumor mass. The pancreas shows nodular growths ranging from two mm. in diameter up to eight mm.; mesenteric glands throughout the peritoneum also enlarged. There is a large nodular mass on the left side of the neck extending from the mastoid posteriorly to the median line anteriorly and down into the mediastinum; right psoas muscle and bronchial glands show tumor involvement.

CASE IX.—University of Pennsylvania autopsy records, 1901, 247, vol. vi, pp. 276-278. Negress, aged twenty-eight. Blockley Hospital. Autopsy performed by Dr. Simon Flexner. Anatomical diagnosis, adenocarcinoma of mammary glands, with invasion of adjacent tissues, ribs, and pleuræ; metastases of axillary glands with involvement of right axillary vein and brachial plexus; metastasis of bronchial and supraclavicular lymph glands and of liver and kidneys; serofibrinous pleurisy. The glands at the reflection of the pericardium over the great vessels are enlarged and contain tumors. Heart weighs 230 gms.; pericardium smooth; cavity and valves of heart normal; aorta above the valves shows slight elevation without degeneration. The thyroid gland is free from tumor; spleen weighs 70 gms.; liver weighs 1580 gms.; metastases in each lobe, the largest mass being in the left lobe; bladder, adrenals, stomach, pancreas, intestines are normal. The kidneys show metastases.

CONCLUSIONS.

1. Tumors of the heart are not common.
2. Primary tumors of the heart are rare. There are about 150 cases on record in the literature.
3. Primary sarcoma of the heart is very rare. There are about forty cases recorded.
4. There are probably many cases of secondary sarcoma of the heart that are never reported in the literature. They are not comparatively much less common than secondary cancer of the heart.
5. Myxomata, rhabdomyomata, and fibromata of the heart are met with occasionally.
6. A case of primary sarcoma of the heart is reported.
7. Seven cases of metastatic sarcoma of the heart are reported. Two cases of secondary carcinoma of the heart and pericardium are reported.
8. A review of the literature is included.
9. The correct diagnosis of cardiac tumor has never been made clinically. Electrocardiographic, fluoroscopic and x ray examinations may be valuable aids in making such a diagnosis.
10. All cases of cardiac tumor should be reported.

[Reports of cases VII, VIII, and X, together with the list of references and complete bibliography, will appear in the author's reprints. Their omission was due to lack of space.—Editors.]

Editorial Articles

INDICATIONS AND CONTRAINDICATIONS FOR SPINAL ANESTHESIA.

Although an effort has been made by many surgeons, especially Chaput and Jonnesco and their collaborators, to make spinal anesthesia a routine procedure applicable in all kinds of operations in all regions of the body, taking the place of general narcosis with ether or chloroform, it is probable that the majority of surgeons at the present time regard it as a method applicable only in certain cases. This is unquestionably the most rational view.

Spinal anesthesia, whether produced by stovaine or similar drugs, has its indications, and it is evident that the principal indication is the site of the operation. In spite of the enthusiasm for this form of anesthesia and its extensive use, particularly in Rumania by Jonnesco's technic, it is nevertheless true that it is particularly indicated in operations on the lower limbs in the anoperineal region, on the pelvic organs, and in gynecological operations in general. Many surgeons maintain that it is to be used only in operations involving structures below the umbilicus, but experience shows that when Jonnesco's technic is employed with exactitude and manipulated by skill and prudence, the indications can be extended to all cases in which a sufficient anesthesia can be obtained by an injection given low down, that is to say, in the dorsolumbar region, consequently in the majority of abdominal operations.

In those cases where spinal puncture must be made in the dorsal region in order to obtain the necessary anesthesia, that is, for operations on the thorax and upper limbs, a certain reserve is in order. It cannot be denied that many surgeons, and Jonnesco in particular, have obtained perfect anesthesia without accident by high puncture, but, generally speaking, the anesthesia obtained in these conditions is often imperfect. The technic is more difficult and necessitates great skill on the part of the operator, not so much for the puncture itself as for the position in which to place the patient, as well as the dose of anesthetic employed. Spinal anesthesia would seem to have exceptional indications in operations on the skull, face and neck, as its use here entails real danger.

There are other considerations involved in the use of spinal anesthesia beside the site of operation. It possesses unquestionable advantage in army surgery or in country districts, as it does away with the necessity of an extra assistant often difficult to obtain. It also has advantages of another character. The patient, although insensible to pain, is conscious during the operation and in cases where the patient's consent may be necessary for extending the field of the operation, this is of the utmost importance to the surgeon.

Lastly, in a general way it may be said that lumbar anesthesia is indicated where there are contraindications for general anesthesia on account of organic cardiac lesions, a renal or pulmonary process, or a profound organic decline. Jonnesco maintains that there are no contraindications for spinal anesthesia, but in spite of this high authority we believe that in operations on the head and neck this form of anesthesia is distinctly contraindicated unless any other procedure of narcosis is impossible, a condition unlikely to be met with in practice. Jonnesco believes that age has no bearing on the indications for the use of lumbar anesthesia, yet some competent observers maintain that it is more useful in elderly subjects than in the young because of the thickness of the *scagliola,* which prevents diffusion of the anesthetic solution. Another contraindication is chronic suppurative processes of the viscera, such as arteriosclerosis and affections of the central nervous system, as well as renal or hepatic insufficiency when these are detected, as they should be, before operation is undertaken.

THE FUTURE OF MEDICINE?

"What is to be done? The doctors can do nothing, for medicine is powerless. Unhappily, it will not remain so for a long time. Much work will have to be done to rid humanity of the scourge of disease. But, surely, one day science will succeed in doing so; that will be chiefly through prophylaxis and rational hygiene. There will also be a new science—the science of death; it will be known how to make it less hard." So spoke Elie Metchnikoff at the time of his last illness. [*Life of Elie Metchnikoff,* 1845-1916, Olga Metchnikoff, Houghton Mifflin Co.] Metchnikoff, a grand figure in the world of scientific endeavor whose greater works were overclouded by the popularized ones on the bacillus of "long life." He ingeniously worked out the theory of phagocytosis; he studied many phases of life physical, physiological and psychical, and attempted to learn more of that great mystery—death.

Throughout his life and on his death bed Metchnikoff felt that "medicine is powerless." He had seen much of the evolution of medical science. He had seen medicine groping about attacking this problem and that and through it all a lack of the cohesion which in a measure was due to the strivings of the individual members of the profession which led into divergent channels and prevented a unity of purpose. Each worker felt his problem of prime importance. Perhaps it would have been had a central purpose been aimed at by the group or by several groups. The microscope came as an aid to medical science, an instrument of precision to some, to others a toy. It revealed many wonders and led to many discoveries. Chemistry contributed her share. Libraries became choked with volumes which were seldom read. And with all the advantages and the many limitations men like Metchnikoff and other keen observers remained optimistic, for they felt that somehow medicine, like man, was lumbering along. With all the surplus loads which they had to carry and all the waste of energy, some construction was going on continually.

And so the struggle continues, workers become interested in one phase of the intricate subject of medicine and attempt to work out new theories and bring new ideas into practice and these men are called, for the want of a less stigmatic name, specialists. Philosophical observers see frequent myopic observations made by these socalled specialists and warnings fill the air. After a meek defense the specialist ceases defending himself, admits nothing —but continues working in his specialty. For what can he do? The field of general medicine is too great to be covered in any but a mediocre fashion. The day of the "all-around-specialist" is no more. Some specialists realize the horrible truth of the dangers of becoming provincial in their sphere of interests and shout warnings to each other—in all good faith. Some special specialists become so technical in their terminology that their language is only understood by some few fellow workers. The average medical man has the feeling of reading a foreign language when he attempts to investigate the progress of some specialty with which he is little familiar.

Laboratory workers go gaily on with intricate tasks, making all sorts of discoveries, working out all manner of complex problems, and the average physician knows nothing of what is going on. Most of the work is lost! Most of their findings are never read. Certain psychologists take simple material and when they have finished the results are so complex that they are of no use to man or beast. With all of this going on the only thing the practising physician can do is to pretend he is sublimely ignorant and plod along with the little he actually knows and use it to the utmost of his ability. When he is confronted with a difficult problem which he knows is beyond his ability he will call to his aid some specialist in whom he has confidence. He is little concerned with the evolution of the specialist or that the specialist's views have been narrowed by his specialty.

In many instances the specialist can not see the forest for the trees; that is, he can not see the entire human being in the patient, on account of his interest in some special part of the patient. On the other hand, the general practitioner can not see the trees for the forest. He can not detect the affected part in the patient. Time and need will reconcile these extremes. Progress has been made, but scientific medicine is in its infancy.

These are some of the problems that Metchnikoff foresaw, and yet he remained patient and optimistic, for he knew the eventual result would be satisfactory. It is easy enough to remain optimistic when we consider evolutionary processes, but this optimism should not cause us to refrain from seeing the weaknesses of our own house.

LESIONS IN NEIGHBORHOOD OF DUODENAL ULCER.

Ulcer of the duodenum may give rise to a number of anatomical lesions in its proximity, and among these vascular lesions are quite frequent. The intimate relationship of the trunk of the pancreaticoduodenal artery with the first portion of the duodenum, and the arrangement of its branches in a double arch over the second portion of the duodenum, explain the frequency of its morbid changes in duodenal ulcer. As the ulcer progresses in depth it reaches the vessel, erodes its walls, resulting in an aperture with indurated edges and without any tendency to retract.

In three cases of duodenal ulcer the gastroomental artery was involved, while lesions of the mesenteric and hepatic arteries and portal vein have been recorded. The latter vessel may simply be compressed and thrombosed. Finally Devé had published a case of acute aneurysm of the abdominal aorta in contact with a retropancreatic pus focus following an ulcer of the fourth portion of the duodenum, while two other similar instances have been observed by Strich and Grünfeld.

Lesions of the biliary tract and pancreas are not so well known and their study is of recent date. Quillard, Klippel and Chabrol refer to pancreatic complications during the evolution of duodenal ulcer, especially those of the internal wall of the second portion. The infrequency of these complications is explained by the rarity of ulcers located so far away from the pylorus.

Various types of pancreatitis are met with, from simple fibrous reaction around the ulcer to the presence of enormous cavities in the gland without interposition of connective tissue. The excretory ducts are always changed, occluded at the ampulla, and dilated about it. Suppurating pancreatitis has occasionally been met with. There is almost always peripancreatitis, especially behind ulcers of the second portion and in front of those arising in the first portion, and may be mistaken for a neoplasm by palpation.

Compression or occlusion of both the choledochus and Wirsung's duct occur from ulcer seated near Vater's ampulla and compression or occlusion of the choledochus in ulcer of the posterior wall of the duodenum with or without infection of the biliary tract. The choledochus has been severed in its retroduodenal portion by a duodenal ulcer.

Adhesion between the gallbladder and ulcer, resulting in a cholecystoduodenal fistula, has been reported by Hoffmann, Moynihan, Perry and Shaw, likewise compression of the cystic duct with hydrops of the gallbladder. The hepatic complications are usually the consequence of occlusion or infection of the bile ducts or may directly depend upon perforation of the ulcer.

PHYSICIAN AUTHORS: DR. WILLIAM OSLER.

There are comparatively few people, in or out of the medical profession, who know how enchanting a writer was the late Dr. William Osler, that great Canadian diagnostician and teacher whose brilliant and manysided career came to an end just a few hours before the close of the year 1919. Why is not Dr. Osler more widely read today? Why are not those writings of his, covering a great range of subjects beside those pertaining to medicine and medical history, better known to the general public?

There are several reasons. The chief of these is that his fame as a physician and scientist completely overshadows his fame in any other direction, and as a result the general reading public shies away from his books. It is well nigh incomprehensible to the public that a great scientist can write anything that is not of the dry as dust category. The public has a deep and abiding abhorrence of anything too deep, and does not like to take chances on the product of a man with the reputation of a profound thinker. He is never given the credit of versatility and moods. The taint of superhighbrowism is on him and he remains a sealed book to all and sundry outside the inner circle. Dr. Osler made the mistake (!) of becoming too renowned in his line of work. He was quoted too much and discussed too much in print—perhaps, during his life, more than any other physician the world has known. The fact that he was a physician, and a great one, was burned into the public mind on divers occasions, especially after the odd circumstance at Baltimore which brought into being the verb "to Oslerize." It killed his chances, for this generation, of becoming a best seller even in that neglected department of literature in which he excels. It associated him, for the time being at least, in the mind of the average man as one of those intellectual giants whose processes are unintelligible to the common run of men. He has failed of popularity as a writer for the same reason that an intellectual drama fails while a girl-and-music show next door succeeds. He requires too much involuntary concentration.

Men, alas, are slow in finding the treasures that lie close about them. Perhaps by the time the Osler centenary is celebrated things will have changed. The human mind and intellectual appreciation will have progressed to the point where fame in one direction will not hamper fame in another. Or perhaps Dr. Osler's fame as a physician will by that time have become so dimmed, outside his profession, that the public will think of him first and last as a writer. That sort of thing has happened frequently. If it happens in the case of Dr. Osler it will be an approbation of his work that is justly deserved.

Dr. Osler's writings are many and varied. His bibliography, covering a period of forty-nine years, comprises no less than 730 titles, including his collected essays and addresses, according to Dr. Harvey Cushing, his biographer. "His charm as a writer," says Dr. Cushing, "had much to do with his great success as a teacher. . . . His *Textbook of Medicine* (200,000 copies) was translated into French, German, Spanish, Chinese and other languages. . . . It remains the most used and most useful book in medicine today."

Dr. Osler was extremely fond of literature and of literary allusion. He was an omniverous reader and, having a retentive memory, his mind was stored with quotations and incidents. It was a quotation that brought about the famous sixty-year deadline story that made him the talk of two continents. In his farewell address at Baltimore, where he had been connected for sixteen years with Johns Hopkins University, he quoted from *The Fixed Period,* one of Anthony Trollope's rarer novels, in which the theory is advanced that the greatest work of man is done before he reaches forty and that it would benefit society in general if chloroform were administered to all on their reaching sixty. This is how he happened to be misquoted as to chloroforming all men over sixty. In quoting Trollope he jested, trusting to his hearers, as well he could, confidently enough to understand that he knew as well as they did that the utility of man has no such limitation. He was himself fifty-five years old at the time and his remaining fifteen years were years of great activity and his greatest influence. During the last five years he devoted himself with great vigor to the great problems thrust upon his profession by the World War—the treatment of shell shock and other nervous diseases and the development of better methods of treating wounds, and it was this strenuous work, coupled with bereavement over the death of his only son in the war, that hastened his death. The son, Revere Osler, was mortally wounded in action in Flanders on September 2, 1917, in the famous Ypres salient, and was buried there.

Dr. William Osler was born on July 12, 1849, at Bond Head, Ontario, the eighth of nine children. His father was a clergyman, who had come to Ontario from England in 1837. After graduating from Trinity College, Toronto, in 1868, Osler entered McGill University and obtained his medical degree there, which he followed up with two years' study abroad, returning to Montreal in 1874, where he leaped into prominence as the new professor of the Institute of Medicine of his alma mater. Thus at twenty-five he was a professor in a chair which governed the teaching of pathology and physiology. There he got ten years of active scientific work which laid the foundation of his subsequent eminence in his profession. In 1884 he accepted a position in the University of Pennsylvania and five years later he became connected with the newly established Johns Hopkins Medical School at Baltimore. It was there that he became recognized as the most eminent and widely influential physician of his time.

In 1904 he accepted the Regius Professorship of Physic at Oxford University, the most honored post in medicine the United Kingdom can offer. This position, founded in 1564 by Henry VIII, is a sinecure and aims to give leisure for literary pursuits, but Osler did not take advantage of his ease. Instead, he interested himself more than ever in the science of medicine, especially during the war years, prior to which he devoted much of his time to the University Press, of which he was elected a delegate, and to the Bodleian Library, of which he was one of the curators.

Dr. Osler had a remarkably great career. As a physician and as a writer he was exceptionally gifted. His mind was packed with wisdom and with beauty and he had a genius for expressing that wisdom and beauty that makes him stand out a physician among physicians and a man among men.

THE REGAINING OF PARADISE.

In turning back the leaves of the centuries one finds many a striking presentation of some thought which had been believed entirely new today. It is a reminder that humanity is only turning over problems which are never new because they are those ingrained in its very nature. Present day society may struggle against some solution which forces itself because it finds it a disturbing one to the dully accepted ways of thought. Yet one finds that somewhere in the past some other sensitive thinker recognized the need of such a solution and perhaps stated it with unusual grace.

More than a hundred years ago a harassed young poet was carrying along the publication of a literary journal in Berlin. He was out of tune with his time, he was out of tune with himself. He was one of those of whom Freud says, "The artist is an incipient introvert who is not far from being a neurotic." In truth he was neurotic. Therefore he was in keen touch with the contents of the unconscious yet strangely blind to a saving solution for his own life. His intimate confessions of himself in his letters taken with his work in drama and short story furnish strong evidence of the blindness one's own complexes can work towards oneself while there exists a keen objective appreciation of the psychic significance of unconscious factors. Such factors in the lives of his created characters were touched by this poet with the sure strong hand of genius.

Yet it was in himself, too, that he felt the crying need of a larger knowledge of the self, the opening of a larger chapter of mankind which would include understanding of the unconscious. And today we still fight against that! We still object that investigation of the things of the unconscious will promote a sickly selfconsciousness, will destroy the grace and purity of youth and adult.

Not so to our poet's way of thinking. If one wants to be swung down with delightful motion into an appreciation of the place of the knowledge of the hidden things, of the value of "an enlargement of the field of consciousness," let him peruse once and again Heinrich von Kleist's brief essay *Uber das Marionettentheater*. It appeared in his *Abendblättern*, which had a brief existence in Berlin early in the nineteenth century, and can be found in any collection of his published works. The profundity hidden under its subtle simplicity is not realized all at once. The significance of his gracefully established contention only slowly relates itself to the greatest need of mankind, a need which the life and death of this poet painfully emphasize.

In apparently fictitious manner he presents a discussion between himself and a skillful dancer. The latter asserts that the dancer has much to learn from the perfectly spontaneous, that is, completely unconscious movements of the marionette. The development of the theme brings to the poet's mind an incident of lost grace in a youth who became acutely conscious of his hitherto unrecognized charm. This incident, it may be said, is also a rich commentary on those important factors, narcissism and exhibitionism, which play together in and out of the unconscious. What then, in the light of such an incident and of the dancer's discussion, is the ideal? This the poet seeks to know. Surely it cannot be a return to the lawless uncontrol of the unconscious. The experience of the youth on the other hand reveals the danger of a mere unrelated intrusion into consciousness of one's personal assets. The poet is growing convinced that the dancer is right. Knowledge closed the gate of Paradise, perhaps it alone can open it again. There is another chapter of human history to be developed. Grace "appears in purest form at that time when there is no consciousness or an infinite one, that is, in the mannikin or in God." "Must we then again eat of the tree of knowledge in order to return to the state of innocence?" "Certainly . . . that is the last chapter of the history of the world." Shall we today shrink from entering into it because it necessitates some trouble and some unpleasantness?

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Obituary.

JOSEPH MacDONALD, JR., M. D.,

New York.

Dr. Joseph MacDonald, managing editor and publisher of *American Journal of Surgery*, and copublisher of *Medical Pickwick*, died suddenly in his office on January 7, 1922, of cerebral hemorrhage, at the age of fifty-one.

Dr. MacDonald was born in Branchville, N. J., in 1870. He spent many years in medical journalism. He rose from office boy to manager in the office of the *International Journal of Surgery*. In 1905—meanwhile having received his degree in medicine—he resigned from that position to establish the Surgery Publishing Company and the *American Journal of Surgery* (formerly the *American Journal of Surgery and Gynecology*). From the outset he associated with himself a New York surgeon, Dr. Walter M. Brickner, as the editor in chief. Dr. MacDonald was ex-president and, for many years, secretary of the American Medical Editors' Association, an organization in which he was deeply interested and in whose affairs he was an active and earnest factor.

He was an officer in the Medical Reserve Corps of the United States Army since 1909. Upon our entrance into the war he was commissioned a captain and, in December, 1917, a major. Later he was appointed a member of the General Medical Board at Washington.

A few months after his discharge from the army in 1919, Dr. MacDonald suffered a cerebral hemorrhage causing a hemiplegia, from which he recovered largely by dint of plucky perseverance—a characteristic that dominated all his activities. He was a hard worker and extremely energetic. He was always genial, frank and optimistic.

JOSEPH MacDONALD, JR., M. D.

Dr. MacDonald had a magnetic personality. He had a host of friends, within and without his profession, who will mourn his early death. He is survived by a wife and sister, Mrs. W. C. McKeeby, wife of Dr. McKeeby, of Syracuse, N. Y.

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News Items.

Chair at Yale in Honor of Dr. Carmalt.—An anonymous gift of $100,000 has been made to Yale University for the establishment of a professorship in the medical school in honor of Dr. William H. Carmalt, who retired several years ago after fifty years of distinguished service as a surgeon.

Tri-State Medical Association.—The next annual meeting of the Tri-State Medical Association of Virginia and the Carolinas will be held in Norfolk, Va., February 21st and 22d, under the presidency of Dr. W. W. Fennell, of Rock Hill, S. C. Dr. James K. Hall, of Richmond, Va., is secretary-treasurer.

Urological Department at St. Mark's Reorganized.—Dr. Victor C. Pedersen is now in sole charge of the Urological Department of St. Mark's Hospital, which has been reorganized, with daily service in two divisions on alternate days. There is a good opportunity for young men to receive instruction as assistants in the clinic. Those who are interested should make application to Dr. Pedersen.

St. Louis Meeting of American Medical Association.—The Local Committee of Arrangements of the A. M. A. says that the May meeting of the association promises to have the largest attendance of any meeting in the organization's history. Early hotel reservations are advised, as these meetings tax to the limit the hotel capacity of the cities in which they are held. Reservations should be made by communicating direct with the hotels. If satisfactory arrangements cannot be made in this way, write to Dr. Louis H. Behrens, chairman of the Committee on Hotels, 3525 Pine Street, St. Louis, Mo.

Harvey Society Lecture.—Mr. Joseph Barcroft, F. R. S., Fellow, Kings College, Cambridge, will deliver the sixth Harvey Society Lecture at the New York Academy of Medicine, Saturday evening, February 11th, at eight-thirty. His subject will be the *Raison d'Etre* of the Red Corpuscle.

Middleton Goldsmith Lecture.—Professor Thomas Hunt Morgan, of Columbia University, will deliver the Middleton Goldsmith Lecture of the New York Pathological Society at the New York Academy of Medicine, Friday evening, February 3, 1922. His subject will be Some Possible Bearing of Genetics on Pathology.

Rockefeller Institute Anniversary.—The Rockefeller Institute for Medical Research on January 20th celebrated the twentieth anniversary of its foundation with a reception at which brief speeches were made by Mr. John D. Rockefeller, Jr., of the Board of Trustees, and Dr. William H. Welch, of the Board of Scientific Directors.

New York Medical Week.—The Medical Society of the County of New York has established an official organ, published weekly, under the name of the *New York Medical Week*. It will represent the activities of the medical organizations of Greater New York, and will endeavor to present the trend of professional thought in New York. The first number was issued on January 21st.

Personal.—Dr. William J. Robinson and Dr. Martin Rehling were unanimously reelected for the eleventh successive time president and secretary, respectively, of the Medical Board of the Bronx Hospital, at the annual meeting held on January 12th.

Dr. Otto Glogau has been elected an honorary member of the Vienna Otological Society.

International Society of the History of Medicine.—It is announced that an international society has been established in Paris for the study of the history of medicine. The officers are Dr. Tricot Royer, of Anvers, president; Professors Giordano of Venice, Singer of Oxford and Jeanselme and Ménétrier of Paris, vice-presidents, and Professor Laignel-Lavastine, of Paris, secretary general. A convention will be held at London in July, 1922, when these subjects will be taken up: The Principal Localities of Epidemic and Endemic Diseases in the Middle Ages, in the Occident and the Orient, and the History of Anatomy. Professor Singer will act as chairman.

Gifts to Medical Department of Columbia University.—The largest single item in the past year's aggregate of gifts to Columbia University is $777,742.45 from the estate of the late Joseph R. De Lamar, to establish the De Lamar Fund in the School of Medicine. Other gifts for work in medicine and surgery were: $6,000 from an anonymous donor for the Surgical Research Laboratory; $1,377.42 from Harry Payne Whitney to be added to the surgical department appropriation; $4,000 from the Commonwealth Fund for rickets research; and $5,000 from Dr. William Perry Watson to establish the Watson Foundation in Pediatrics. Dr. Walter B. James, former president of the Academy of Medicine, gave $600 toward the expenses of the university's representative on the British Peru expedition.

Officers of Greater New York Association.—At the annual meeting of the Medical Association of the Greater City of New York, held on January 16th, Dr. George L. Brodhead was elected president, Dr. E. E. Smith was elected recording secretary, Dr. Robert E. Coughlin, chairman for the Borough of Brooklyn, and Dr. William Bryan, chairman for the Borough of Richmond.

Influenza Epidemic in England.—Despatches from London dated January 20th state that there is no abatement in the infleuenza epidemic in Great Britain. During the week there were 1,262 deaths from the disease, an increase of 443 over the previous week, besides 707 deaths from bronchial pneumonia. The aged are particularly affected, the deaths in London, for instance, including 116 persons whose ages ranged between sixty-five and seventy-five years. Greater London is still the storm centre of the outbreak, 1,021 Londoners having succumbed out of a total of 1,262.

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Died.

Andrews.—In Portland, Me., on Tuesday, January 10th, Dr. Egbert T. Andrews, of Gray, Me., aged seventy-seven years.

Apfel.—In Brooklyn, N. Y., on Thursday, January 5th, Dr. Fanny Wohlfeil Apfel, aged eighty-one years.

Booth.—In Newport News, Va., on Thursday, January 5th, Dr. Edwin G. Booth, aged eighty-two years.

Davis.—In Golden, Colorado, on Monday, December 26th, Dr. Arthur Davis, of Durango, Colorado, aged forty-five years.

Delaney.—In Emden, Mo., on Monday, January 2nd, Dr. Gregory Delaney, aged forty years.

Dodson.—In Nanticoke, Pa., on Saturday, January 14th, Dr. Daniel Webster Dodson, aged sixty-nine years.

Du Jardin.—In New York, on Saturday, January 7th, Dr. Roland Du Jardin, aged sixty-five years.

Farrell.—In New Brunswick, N. J., on Friday, January 13th, Dr. Caroline March Wikle Farrell, aged forty-eight years.

Felton.—In Hanford, Cal., on Sunday, January 8th, Dr. L. E. Felton, aged seventy-two years.

French.—In St. Joseph, Mo., on Tuesday, January 3rd, Dr. John Andrews French, aged sixty-eight years.

Gerhard.—In Lancaster, Pa., on Wednesday, January 11th, Dr. Milton Ursinus Gerhard, aged sixty-one years.

Green.—In Boston, Mass., on Thursday, January 5th, Dr. John Orne Green, aged eighty years.

Groom.—In Greene, Iowa, on Friday, January 6th, Dr. James Warmer Groom, aged thirty-nine years.

Hickman.—In Sacramento, Cal., on Friday, January 6th, Dr. William S. Hickman, aged sixty-five years.

Howard.—In Rockford, Ill., on Thursday, December 29th, Dr. Glenn A. Howard, aged forty-one years.

Hower.—In Cropper, Ky., on Saturday, December 24th, Dr. Thomas Jefferson Hower, aged fifty-nine years.

Hubbard.—In Taunton, Mass., on Monday, January 16th, Dr. Charles T. Hubbard, aged eighty-one years.

Jacobs.—In Manitowoc, Wis., on Wednesday, January 11th, Dr. Eliab M. Jacobs, aged sixty-three years.

Kennedy.—In Newburgh, N. Y., on Tuesday, January 10th, Dr. Edward V. Kennedy, of Brooklyn, N. Y., aged thirty years.

Kennedy.—In Pottsville, Pa., on Thursday, January 12th, Dr. Louis T. Kennedy, aged forty-nine years.

Kreider.—In Springfield, Ill., on Wednesday, January 4th, Dr. George N. Kreider, aged sixty-five years.

Kurrus.—In New York, on Tuesday, January 17th, Dr. John Kurrus, aged fifty-six years.

Mathews.—On Thursday, December 29th, Dr. William Pearce Mathews, aged seventy-eight years.

McCartney.—In Pittsburgh, Pa., on Tuesday, January 3rd, Dr. James S. McCartney, aged ninety years.

Book Reviews

SURGERY IN A POCKET EDITION.

A Pocket Surgery. By Duncan C. L. Fitzwilliams, C. M. G., M. D., Ch. M., F. R. C. S. (Edin. and Eng.), Fellow (Late President) of the Royal Medical Society of Edinburgh; Fellow of the Medical Society of London and Royal Society of Medicine; Surgeon in Charge of Out Patients and Lecturer in Clinical and Operative Surgery, St. Mary's Hospital, London, etc.; Author of *A Manual of Operative Surgery.* New York: Longmans, Green & Co.; London: Edward Arnold, 1921 Pp. 348.

In this closely packed little volume of 348 pages, the author has apparently succeeded in his attempt to confine within a small compass the whole range of examination surgery for students and general practitioners. The author is correct in his statement that surgery cannot be learned from textbooks; he has therefore given all the necessary headings and a very short yet complete account of the details which the student is supposed to have learned elsewhere in his training. The work is divided into forty-four chapters and a rather inadequate index. The text is well written, the teaching is conservative, though not devoid of occasional errors. In the chapter on syphilis, for example, the author recommends mercurial treatment by the mouth as being "most convenient for the patient." Salvarsan is administered in a course of three to five injections, apparently not repeated.

The typography is excellent, considering the vast amount of matter presented in so little space, but there are irritating typographical errors which indicate careless proofreading. On the whole, however, the work is a useful addition to the reading matter required by the medical student, especially in preparation for examinations.

ACUTE ABDOMINAL CONDITIONS.

The Early Diagnosis of the Acute Abdomen. By Zachary Cope, B. A., M. D., M. S. (Lond.), F. R. C. S. (Eng.), Surgeon to Out Patients, St. Mary's Hospital, Paddington, etc. The Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton, 1921. Pp. xv-223.

Acting on the truism that early diagnosis means better prognosis, the author has striven and succeeded in presenting the diagnosis of acute abdominal inflammatory conditions in a manner that must be of considerable value to the surgical practitioner. Primarily the work aims to assist the reader in attaining a correct judgment in the evaluation of the various puzzling symptoms which are present in urgent abdominal disease. The teachings of Murphy, Moynihan, Maylard and others are frankly followed and freely expressed; in addition the author has given a number of diagnostic points as regards acute conditions of the abdomen which he believes either have never been recorded or to which insufficient attention usually has been paid in works of this kind. In the former category may be mentioned the localizing diagnostic value of phrenic shoulder pain, the obturator test, and the test for differentiating between pain of thoracic and abdominal origin; in the latter class he gives as examples the area of hyperesthesia caused by a distended inflamed appendix, the pathognomonic axillary area of liver resonance in cases of perforated ulcer, the psoas extension test and the confusing significance of testicular pain.

The treatment may be summed up by saying that with a few exceptional cases operation at the earliest possible moment by a competent surgeon is the treatment which gives the best results in practically all acute abdominal diseases. There are twenty-eight illustrations which help to elucidate the text; there is no bibliography, but a very satisfactory index. Typographically the book is typical of the Oxford Medical Publications, which means excellence in medical bookmaking; but we feel that the unusually large type in which the text is presented does not serve any particularly useful purpose. The book is a most worthy contribution to our knowledge of acute abdominal inflammations and should prove useful not only to the surgeon but to the general practitioner, to whom falls the responsibility of making the earliest diagnosis in these difficult cases.

TEXTBOOK OF PSYCHOLOGY.

Psychology. A Study of Mental Life. By Robert S. Woodworth, Ph. D., Professor of Psychology in Columbia University. New York: Henry Holt & Co., 1921. Pp. x-580.

A distinctly helpful textbook for the beginner in psychology. Throughout the work a tendency is shown to desert the more static psychological concepts and to set forth more dynamic concepts of psychology. The unconscious is accorded a prominent place. While many of the medical allusions are somewhat sketchy, especially those regarding the glands of internal secretion, on the whole the book manifests a hopeful trend in the realm of academic psychology.

EXAMINATION OF THE INSANE.

Examen des aliénés. Nouvelles methodes biologiques and cliniques. Par André Barbé, médecin alieniste des Hôpital de Paris. Preface, de M. Le Dr. Seglas, médecin de la Salpetrière. Paris: Masson & Cie, 1921. Pp. xv-178.

Should Barbé's aspiration to build the study of psychiatry on a foundation of laboratory methods be realized, we should be led into a wilderness of test tubes which would be more confusing than the mutterings heard in delirium. There is no question that many psychotic states have an organic origin of a physical nature which can be detected by laboratory methods. But there are many neurotic, psychoneurotic, and psychotic states which have no organic basis and are cured without the use of physical measures and laboratory methods are not necessary for a diagnosis. There are points of interest in the book but these have no more relation to the psychoses than to cardiology or ophthalmology. The book, on the whole, is sketchy and presents many points as fact which have not as yet been proved, even by the most ardent laboratory workers.

SURGICAL ANATOMY.

A Textbook of Surgical Anatomy. By William Francis Campbell, A. B., M. D., F. A. C. S., Surgeon in Chief, Trinity Hospital; Formerly Professor of Anatomy and Professor of Surgery, Long Island College Hospital; Consulting Surgeon, Methodist Episcopal, East New York and Brownsville, Coney Island, Swedish, Jamaica, and Zion Hospitals. Third Edition, Revised, with 325 Original Illustrations. Philadelphia and London: W. B. Saunders Company, 1921. Pp. 681.

The fact that this work has reached its third edition is sufficient proof, if such were wanting, of its intrinsic merit as an aid in the study of anatomy as applied to surgery. The author has striven to present only such anatomical facts as have a practical bearing on the science and art of surgery, and he has succeeded in compressing within the comparatively small space of one volume a trustworthy and readable description of those structures and anatomical regions that are of peculiar interest to the surgeon. The text matter is interspersed with short but pithy surgical rules and suggestions that must be of great value to the student or surgeon who adopts them as his own. The illustrations are a distinct revelation and add materially to the value of the work. The teachings follow the usual, conservative lines of the successful surgeon and clinical teacher, who aims to instill in his readers the need of developing a "surgical mind" as well as an "aseptic conscience." Typographically the work is all that could be desired, and the publishers have succeeded in presenting the author's message in a manner that brings full credit to the art of medical bookmaking.

HAVELOCK ELLIS'S IMPRESSIONS AND COMMENTS.

Impressions and Comments. Second Series. 1914-1920. By Havelock Ellis. Boston and New York: Houghton, Mifflin & Co., 1921. Pp. 248.

Physicians who know Havelock Ellis only through his work on the psychology of sex, will become acquainted with another side of the man through his *Impressions and Comments,* for here we see revealed the man that we sense in his more strictly scientific work. He shows his kindliness and wisdom; his broad background enriched by an interest in the higher cultural acquisition of mankind. We find him expressing himself by all that touched him, from roses to war, commenting honestly and entreating earnestly for the things he believed in and thought best. Those who have followed his guidance over many years in psychopathology, in his appreciation of literature, and in his forensic interests, have found little ground for reproach. The universality of his concepts are refreshing. He was horrified by the war (and he gave reasons aside from the ordinary emotional ones) and he was mortified by the conqueror's peace, even though he happened to be one of the race of the victors.

In all his rambles we follow him; in rainy London; along peaceful English country roads; through temples of worship in Italy; up the rocky slopes of Malta; through the old majestic Athens and the confectionery store Athens of today; again to Italy, and finally, on the way to Paris, his umbrella is stolen by a tricky porter. But through all these travels Ellis never loses his philosophical optimistic outlook on life. From his most sordid experiences and encounters he always gets something creative and beautiful.

In this series of comments, we come nearer to a man we have all learned to admire, also to respect for his mild yet true prophecies. He never insists that he is right, yet time generally proves his points for him. His most radical points of view, and these same views appeared to be much more radical in years past, proved to be the most valid; it is only when he attempted to rationalize and temper his own radical points of view that he lost power. We should be thankful to Ellis for allowing us to know him better.

THE NEUROSES.

Hysterie und Pathoneurosen. Von Dr. S. Ferenczi, Nervenarzt, Sachverständiger des Gerichthofes in Budapest. Internationale Psychoanalytische Bibliothek, Nr. 2. Leipzig and Vienna: Internationaler Psychoanalytischer Verlag, 1919. Pp. 78.

This presentation of the various hysterical manifestations, and the phases of psychoanalytical treatment which they call forth, is made in that concise, illuminating manner in which Ferenczi writes. He impresses the reader with his clear insight into the mechanism of hysteria, as well as of the other neurotic problems of which he treats. He has a thorough comprehension of the theories which are involved in these problems. Very suggestive in his paper entitled *Uber Pathoneurosen* in which he discusses the building up of the narcissistic neuroses because of injury to some part of the body. This injury impinges upon the overestimated value of the ego. Perhaps it actually threatens the ego's existence, or it may affect only some portion of the body in which there is overstrong concentration of libido. The paper which reports the author's experience with war neuroses also throws light upon the psychic features which underlie apparently physical disturbances. His analyses here have necessarily not been profound, but they are sufficiently clear as to the psychic interpretation which gives meaning to otherwise inexplicable phenomena.

ANALYTICAL STUDIES

Psychoanalytische Beiträge zur Mythenforschung. Gesammelte Studien aus den Jahren 1912 bis 1914. By Dr. Otto Rank. Internationale Psychoanalytische Bibliothek, Nr. 4. Leipzig and Vienna: Internationaler Psychoanalytische Verlag, G. M. B. H., 1919. Pp. 420-viii.

While some of the papers presented here are familiar to readers of the psychoanalytical periodicals, others are offered for the first time in print. In either case the articles are full of interest. The author is thoroughly grounded in the principles of psychoanalysis and sufficiently versed in mythology and literature to recognize the value in both territories of the psychoanalytical method of investigating human creative products. Moreover, he brings back from such studies much helpful enlightenment for clinical investigation of the same problems. The motives at work in creating myth and literature are universal and are therefore the same motives which are operative in an unproductive manner in mental disturbances.

Rank in his introduction states the true position of psychoanalysis in regard to the territories which may at first seem to lie outside its sphere. It is unwilling to stand aloof from these fields, but it does not assume an authority in those fields which belong to the specially trained worker. It comes confessing its necessary amateur position, but realizing that it has something of its own to offer. It invites criticism and asks only that it may thus be counted a collaborator, as in this work of his, in the important realm of human mental activity known as myth building.

RELIGION AND CULTURE.

Religion and Culture. A Critical Survey of Methods of Approach to Religious Phenomena. By Frederick Schleiter. New York: Columbia University Press, 1921.

Dr. Schleiter's volume contains a useful résumé of the thought of writers dealing with the origin of religious concepts. The author's attitude is purely critical, but not constructively so, in that he himself has no judgment to contribute in place of the views that he tears to pieces so ruthlessly.

His study of the sources from which magicoreligious concepts were elaborated prepares the field by definition of his terms and by pointing out the difficulties. An analysis of the methods used in the study of cultures, the comparative, the unilinear, and the evolutionary, follows. Then he discusses the relation between magic and religion, the two theories of spirit or magical power as the basis of belief, emanation, and causality.

He has attempted to study, not so much the phenomenon of religion in relation to culture, but what other writers have thought on the subject. He has sought to separate grain from chaff without bias, but seems to have found only chaff.

NORTHERN EUROPE IN THE NEOLITHIC PERIOD.

The New Stone Age in Northern Europe. By John M. Tyler, Professor Emeritus of Biology, Amherst College. New York: Charles Scribner's Sons, 1921. Pp. xviii-310.

With something of Dr. Osborn's skill of narrative and a breadth of vision of his own, Dr. Tyler describes the Neolithic period as it affected Northern Europe. The picture is beautifully drawn—so simply that amateurs may follow each line without difficulty. Yet it does not offend the more advanced student of anthropology by any primer tone.

The story is very compactly told. As Dr. Tyler aptly concludes: "We set sail millions of years ago; we shall not arrive tomorrow." Yet in the scope of about three hundred pages the author has touched upon nearly every event of interest in the evolution of man, not only as pertains to Northern Europe but over most of the world as well. His bibliography of reference works and additional reading is important.

A brief excerpt from Dr. Tyler's chapter on Neolithic Religion will serve to show his thinking grasp and delicate rendering of a subject on which ponderous tomes have been written. "It (the old Neolithic religion) was rooted in the firm conviction of the existence of a spiritual world toward and into which its every rootlet was forcing its way. . . . We might better change the illustration and say that it was slowly developing a spiritual eye which peered into a higher world and developed in keenness and clearness of vision in response to the higher pulsations. By patient experiment and experience, which produced a hope that could not make ashamed and a faith in which hope and experiment combined, it was feeling its way into spiritual knowledge. It knew nothing of practical science or of material cause and effect. But its world pulsated with the universal life. It recognized the law of forbidden things and the sure penalty of lawbreaking. It had a tribal conscience and recognized the need of purification. It had the promise, at least, of individual conscience and consciousness of sin."

ESSAYS ON PSYCHOANALYSIS.

The Depths of the Soul. Psychoanalytical Studies. By Dr. Wilhelm Stekel. Authorized Translation by Dr. S. A. Tannenbaum. New York: Moffat, Yard & Company, 1921. Pp. 216.

In this series of essays, which for some strange reason he considers his favorite collection, Stekel presents a few psychoanalytical truths highly diluted with wordy rhetoric. They do not compare in value with his more serious essays which are more mature and less poetic in presentation. His desire is that the book shall make new friends for him among the English reading public. This the book may accomplish. New friends will also be made for psychoanalysis, but they will not be of the lasting kind unless their knowledge of analysis is grounded on a more stable foundation.

PSYCHOANALYSIS.

Zum Kampf um die Psychoanalyse. By Dr. Oskar Pfister. Internationale Psychoanalytische Bibliothek, Band 8. Leipzig, Vienna, Zürich: Internationale Psychoanalytischer Verlag, Ges, m. b. H., 1920. Pp. 462.

Pfister is well fitted by training and experience to set psychoanalysis in its true light in relation to other provinces of psychological investigation and philosophical thought. He points out the mutual interest and the common ground of psychoanalysis and the older experimental psychology, as far as these exist. An appreciation of experimental psychology, fairly given, must include a serious arraignment of its deficiencies. Here, however, psychoanalysis steps in not only to further the work begun but out of necessity to lead it in more productive directions. There follows some discussion of the chief principles of psychoanalysis, such as the existence of the unconscious and its significance in the psychological investigation for which psychoanalysis stands. There are also discussions of some of the types of difficulties to be found, some of the fields where the psychic activity of the human being, pathological or otherwise, may be investigated. Special attention is given to certain exponents of different phases of the application of psychoanalysis or the development of its theory. Attention is also given to the work of Häberlin, a psychologist who utilizes many of the principles upon which psychoanalysis is based and thereby produces fruitfulness in the otherwise barren classical psychology. The relation of psychoanalysis to ethics and other metaphysical or philosophical points of view is also taken up.

The book should aid in breaking down barriers of adverse criticism and bringing psychological workers or speculative thinkers closer together upon the common ground of actual study of human mental activity. Pfister is a writer who sacrifices nothing of a clearly conceived adherence to psychoanalytical principles. Yet he is also well able, perhaps because of this, to appreciate work and thought in other fields, their successes as well as their limitations.

THE EGO.

The Beloved Ego. Foundations of the New Study of the Psyche. By Wilhelm Stekel, M. D., Neurologist and Psychotherapist, Vienna. Authorized Translation by Rosalie Gabler, Member of the British Psychological Society, and the Society for the Study of Orthopsychics. New York: Moffat, Yard & Company, 1921. Pp. xiv-237.

A series of popularized essays on everyday subjects from a modified psychoanalytical viewpoint. They contain a few ideas generally padded with many words which the "artist" assures us are the outburst of his poetic soul. Most people would rather read poetry than cold scientific facts. So books of this kind have a tendency to become popular. It is easier to misinterpret poetry than cold science so books of this kind tend to create as many new psychologies as there are readers. Not that Stekel has strayed far from the fold of orthodox Freudian psychology. He has even taken fundamental facts discovered by conscientious workers and elaborated them in a newspapery fashion and led his readers to believe that he was the originator of the central idea. This he has done with the money complex as worked out by Ferenczi and some of Adler's ideas.

It is difficult to criticize a man who is apparently as earnest as Stekel and whose work contains much that is valuable, but he would do well to parade his "beloved ego" a bit less conspicuously and not dilute his writings so freely.

ANATOLE FRANCE.

Monsieur Bergeret in Paris. By Anatole France. A Translation by B. Drillien. London: John Lane, The Bodley Head, Ltd. New York: John Lane Company, 1921. Pp. 286.

With masterful irony Anatole France tells of the infamies of political France. His own ideas are spoken by Bergeret, the scholar. Gems of thought gleam with crystalline clarity. The intrigues of petty royalists and prostituted petticoats are interspersed with the kindly philosophy of Bergeret. Beauty and sordidness mingle and the only hope he holds is in the future. The few lines wherein he realizes the antagonists of progress are worthy of repetition and reiteration: "The profound and innumerable forces which chain man to the past and cause him to cherish its errors, superstitions, prejudices and cruelties as previous symbols of his security. . . . Prudence makes him imitative and he dares not quit the tumbledown shelter that protected his fathers and which is about to fall in upon him." This, Anatole France realizes and combats with all the vigor of his powerful pen. He is a pessimist for today and withal an optimist for tomorrow. This book makes clear political methods in France and makes understandable many of the occurrences of the Washington Peace Conference.

FAMILIAL ADJUSTMENTS.

Dangerous Ages. By Rose Macaulay, Author of *Potterism.* New York: Boni & Liveright, 1921. Pp. 242.

In *Dangerous Ages* the problem of growing old gracefully is presented. And the still more vital problem of growing up efficiently gives the book a certain value as first in the field of attempted guidance in fiction. Pragmatically work is recognized as the solution. Psychologically and psychoanalytically the writer falls short of success. As an attempt to catch the transition stages between Victorian womanhood and the freedom of sex and mind towards which modern woman the world over is struggling, the story is exceedingly interesting and worth while.

HUNEKER.

Variations. By James Huneker. New York: Charles Scribner's Sons, 1921. Pp. viii-279.

Huneker, the unafraid, finds beauty where others would scarce venture. Critic of all things beautiful, selecting the worthy with unerring wisdom, lauding with unstinted praise. *Variations* visits many places and many peoples. The élite in music—above all music—art and literature and an occasional statesman and philosopher have wandered into Huneker's pages to receive his kindly approval. Weak points are discerned by his intuitive glance, yet he ever chooses to stress the strength. Huneker, in bringing out the lovely in life, has made himself beloved.

PLAYS OF OLD JAPAN.

Plays of Old Japan. Translated by Leo Duran. New York: Thomas Seltzer, 1921. Pp. xii-127.

A distinct service has been rendered in the presentation of these Japanese plays. They give us a glimpse of values unlike our own. Some are as gruesome as the tales of Poe; some hinge upon the emotions of love, jealousy, hatred, and fear; in others sacrifice is the motif. The plays are worthy of reading and study. The book itself is an artistic production worthy of the material.

THE YEAR'S BEST PLAYS.

The Best Plays of 1920-21, and the Year Book of the Drama in America. Edited by Burns Mantle, Dramatic Critic of the New York Evening Mail. Boston: Small, Maynard & Co., 1921. Pp. vi-471.

The plays abstracted have been chosen with great care and few will not agree that the proper choice has been made. The abstracting and editing are well done and an interesting index and description of the personalities engaged in the theatrical profession is appended.

JULIA TAKES HER CHANCE.

Julia Takes Her Chance. By Concordia Merrel. New York: Thomas Seltzer, 1921. Pp. 292.

A smartly written novel which holds the reader from one exciting episode to another. The physician will find in it a delightful book to enjoy in his moments of leisure.

Practical Therapeutics

THE THERAPEUTIC VALUE OF CHLORINE AND SULPHUR DIOXIDE GASES.

By James A. Aupperle,
Middletown, Ohio,
Chief Chemist of the American Rolling Mill Company.

We all know more or less of the toxic or poisonous effects of gases upon the human system, and have learned this from the use of gases in warfare. Many drugs or chemicals which produce a beneficial effect upon the human system when used in small doses produce harmful effects or death when used in excess. This article deals with the benefits which the human system derives from breathing the minute quantities of chlorine gas (the active agent in chlorinated lime), found in the air of laundries or chemical industries manufacturing or using chlorine. The article also deals with the therapeutic value of breathing minute quantities of sulphur dioxide gas in preventing and curing such diseases as pulmonary tuberculosis and influenza.

Up to the present time there has been a great decline in the death rate from tuberculosis. This is shown in United States Public Health Service *Bulletin No. 73*, which shows a decline of about fifty per cent. in one hundred years in three cities, New York, Boston and Philadelphia. In this *Bulletin* will also be found a table which shows the death rate from pulmonary tuberculosis in various cities to be as follows:

AVERAGE NUMBER OF DEATHS FROM PULMONARY TUBERCULOSIS IN 100,000 OF POPULATION.

City	
Pittsburgh	113
Cleveland	120
Chicago	166
St. Louis	176
San Francisco	177
New York	198
Philadelphia	206
Cincinnati	248

It will be seen that Pittsburgh has the lowest death rate and Cincinnati the highest from tuberculosis. We know that Pittsburgh has the reputation of being a smoky city, and I believe that the sulphur in the coal has an important bearing upon the subject. When sulphur burns it combines with oxygen and forms sulphur dioxide, and it is this gas which has great therapeutic value.

In order to prove that this gas is present in the Pittsburgh atmosphere, reference should be made to the 1919 *Proceedings of The American Society for Testing Materials*, page 241, in which it is shown that steel sheets exposed to the Pittsburgh atmosphere at the Arsenal Grounds contained a whitish incrustation of a salt, which upon examination proved to be ferrous sulphate, this sulphate coming from the sulphur in the fuel which had been burned. The same society exposed steel sheets to atmospheric conditions near the seashore and no iron sulphate was found on the underside of these sheets. Many of the steel sheets at Pittsburgh corroded in less than two years from the action of the sulphur gas, but at Annapolis, Md., no sheets corroded away after five years' exposure.

The Metropolitan Life Insurance Company (1) gives the occupational mortality statistics in reference to tuberculosis, and of twelve occupations the longshoremen and stevedores have the highest percentage of mortality. The experience of this company also shows that coal miners have a low tuberculosis mortality. Coal mining is a dusty occupation, and yet the tuberculosis mortality is lower in this industry. It is a well known fact that all coal contains sulphur and it may be that the sulphur gases present in coal mines has a therapeutic value in tuberculosis.

The Prudential Insurance Company's statistics show that of fifty-eight occupations the mortality from tuberculosis is lowest in coal mining and furnace tending, the percentage being less than ten while it runs as high as seventy-eight in other industries. Notwithstanding the popular belief as to the hazardous nature of coal mining, the Prudential Insurance Company (1) gives the average life of coal miners at fifty-one and three tenths years, blacksmiths fifty-five and four tenths years, longshoremen and stevedores at forty-seven years, and bookkeepers and office assistants at thirty-six and five tenths years.

A comparison of the appropriations for combating tuberculosis of coast states and inland states is interesting (2). We find that Massachusetts appropriates $867,906, California $200,000, while the total State Board of Health appropriations of Arizona, New Mexico and Colorado in the aggregate amount to only $82,700. We are told that the benefits tuberculous patients obtain in Colorado, New Mexico and Arizona are due to the dry air. I believe the dryness is contributory only and that the most benefit is obtained from the presence of sulphur gases in the air. These three states have numerous smelters which discharge enormous volumes of sulphur dioxide into the air. The sulphur dioxide is a by product from the sulphur which the ores contain. I have been in cities in Arizona where there was so much sulphur dioxide in the air that one could both taste and smell the gas. The question naturally arises as to whether the burning sulphur does not have great therapeutic value in combating tuberculosis.

It is a recognized fact (3) that lack of ventilation is partly responsible for transmitting tuberculosis, as the following remarks indicate:

> No. 4 is an old brick building, which many years ago was devoted to warehouse and store purposes with living quarters for families in the upper stories. This building has been converted into a cheap lodging and rooming house for negroes, the entrance being through the basement floor. The first room in this basement is a bar. At the time of our visit the license, which had been taken away, had not yet been renewed, but we were informed that it would be only a few days before the bar would be running in the old fashion and the lodging quarters, which had also been abandoned, again be filled to the utmost capacity. In the rear of this bar on the same floor was another room about forty feet long by twenty feet wide. Five negroes were lying on the floor, sound asleep. The proprietor of the place informed us that during the night the floor of this room was

covered with sleeping negroes, often as many as two hundred lying over the floor at one time. These socalled sleeping quarters were given to the negroes free of charge. Any negro down and out and desiring a place to sleep was welcome to floor space if he could succeed in getting in.

On the second floor in the rear we saw a partly dismantled lodging room, which we were assured would be open again in a few days. This room was about sixty feet long. At either end there were two small windows, not over two and one half feet high and about three feet wide. The place was in semidarkness: It was impossible for sunlight to enter this room at any time. The beds were crowded so closely together that one could with difficulty get between them. They were double deckers, an iron bedstead built on the steamboat berth fashion so that one sleeper could be accommodated above another. In this room it would have been impossible for even one person to have found a place to sleep that afforded sufficient ventilation. Although the health department has records of as many as seventy-five cases of tuberculosis reported from this lodging house from January 1, 1910, to July 1, 1914, this is probably only a small percentage of the actual number.

No. 2 is an old church, which has been changed into a lodging house and conducted by methods which are very different from those usually prevailing. The auditorium and the gallery have been converted into one massive dormitory containing two hundred and twenty-four beds. Although the floor space is apparently crowded, the extreme height of the ceiling makes a total cubic foot air content to each bed which is believed to be ample, and the windows are so arranged that a proper air movement can be maintained. The floors of this place are kept scrupulously clean. The bed linen is changed three times a week, or oftener if noticeably soiled. The walls are painted a shade of yellow which makes a soft and pleasing light effect. In the centre of the room are two large steam radiators, which enable an equable temperature to be maintained. These beds cost ten cents a night.

Scattered around at various places toward the edges of the room on the auditorium floor are small cubbyhole rooms, opened at the top and partitioned from each other, each one having a separate door and a single bed. These rooms cost fifteen cents a night. The ventilation in them is poor, but they insure privacy, which creates a demand for them by a certain class of people who are compelled to frequent lodging houses. There are other rooms that cost $1.25 a week. These are light, airy, and scrupulously clean. Opposite the $1.25 rooms are others which maintain the same high standard of cleanliness but are lacking in the proper facilities for ventilation. These rooms rent for $1 a week.

Every one applying for admission to this lodging house on a ten cent basis is compelled to undress in a common room well heated and with shower baths adjoining. His clothes are all placed on a hook, and he receives a check for them. He is then compelled to take a shower bath, after which he receives a clean nightgown and walks to the dormitory. At 11 o'clock at night all the clothing is placed in a fumigator, where it is subjected to the fumes of burning sulphur until 4 o'clock in the morning. A fan is then started, which blows the sulphur out of the fumigator. After this the clothes are taken to a large room, where they are aired and are ready for their owners at 6 o'clock in the morning, at which hour every one except those occupying the private rooms is compelled to get up.

The most important differences between these two lodging houses is that from one overcrowded lodging house which did not use sulphur disinfectant, seventy-five cases of tuberculosis were reported between 1910 and 1914, while from the well ventilated lodging house using sulphur fumes disinfectant, no reference is made to tuberculosis cases.

Chlorine gas has great therapeutic value which is well known, and I hope that the publication of this paper will induce a more general use of chlorine, which can be purchased as chlorinated lime. Dr. Carrel rendered great service in the World War by the use of sodium hypochlorite (the active principle being chlorine). This solution caused rapid healing of wounds and to a large extent prevented infection.

We would not expect laundry workers to be free from tuberculosis, and still, when we consult *Bulletin 73* of the United States Public Health Service, we find that tuberculosis cases have the lowest percentage below the average in health for occupation. The percentage for laundry workers is five tenths, while some industries have ten times the percentage of laundry workers.

A systematic examination was made of all the employees in three laundries. In seven others the listers and markers and a few washers (those who handle unwashed clothes exclusively) were examined, making a total of one hundred and ninety-nine workers in ten different laundries. Four were found (two per cent. of those examined) who showed evidences of tuberculosis. In no one of the four cases were the working conditions in the laundry a factor in the causation of the disease.

Theoretically one would expect to find that the listers and markers in laundries were especially subject to infections. These persons handle dirty clothes exclusively. Sputum soaked handkerchiefs and underclothing soiled with pus discharges pass through their hands in large quantities every day. Twenty-nine of them were examined without disclosing any evidence of tuberculous disease. The majority of these had been handling dirty clothes for several years; fourteen of them had averaged eight and four tenths years at this work with extremes of two years and thirty years in particular instances. All listers and markers, with one exception, were a unit in considering their occupation free from the hazard of infectious diseases. This one exception was a woman thirty-five years old, who had only been in the laundry for four months, and she admitted gaining ten pounds since she commenced the work. It was accordingly evident that her fears rested upon the general theory that disease might be transmitted in this way rather than upon any deleterious influences she had actually experienced. Inquiry was made of all this class of workers as to whether they had contracted scarlet fever, or had been especially subject to attacks of tonsillitis since taking up their work. All were agreed in denying that such had been the case. As bearing upon this subject the report of the State Board of Health of Massachusetts (1907) upon the sanitary conditions of factories, workshops, and other establishments where persons are employed is interesting, much the same conclusions as our own in regard to the health hazard in the laundry business having been reached. This report, page 144, states as follows:

> The laundry business is not uncommonly regarded as one attended by more or less danger of contracting infective disease, because of handling the bed linen and body linen of sick persons; but the returns secured in this investigation do not support this assumption. Those who are most exposed to possible infection are the markers, who are obliged to examine and mark, if necessary, each piece submitted; but, while this work is disagreeable, there is no positive evidence that it is dangerous.

Chapin quotes Landouzy as stating that tuberculosis is twice as prevalent among laundry workers as among other workers, due to the infection from soiled clothing, but as an argument against this Chapin states that certainly in Providence there is no excess of scarlet fever, diphtheria or typhoid fever among laundry workers. This cannot be due to the disinfection of the clothing for much disinfection is not effective, and for six years there has been no disinfection after diphtheria, and, moreover, the linen from carriers and missed cases is nowhere subjected to disinfection (4).

It is a well known fact that laundries use bleach and that the odor of chlorine is pronounced. When considering the opportunity to contract various diseases from handling soiled linen the fact cannot be ignored that chlorine has acted as a preventive in the tendency to contract diseases. The treatment of drinking water with a small amount of chlorine is recognized by health authorities as the best means for combating an epidemic of typhoid fever. Where the chlorine treatment of the city water supply has been installed there has been an immediate decline in the death rate due to typhoid fever.

Just as soon as the medical profession recognizes the value of chlorine as a means to stamp out contagious and infectious diseases, laws should be passed to combat infection with a liberal use of chloride of lime or chlorine in some form. Instead of closing schools and theatres and restricting meetings during an epidemic of influenza, a better plan would be to invite gatherings of people, keep schools and theatres open and have enough chlorine gas in the air to be perceptible to smell. I believe this procedure would stamp out influenza quicker than by restricting meetings.

In considering the subject from another viewpoint it is an established fact that during the epidemic of influenza which took such a toll of human lives during the World War, there were practically no deaths and but very few cases of influenza in industries where chlorine is produced or used.

It has been shown that dampness and dust in the occupation of longshoremen and stevedores predisposes to pulmonary tuberculosis. That may be due to the absence of active gases, such as sulphur dioxide or chlorine. The mortality from tuberculosis in coal miners is low, in spite of the damp or dusty nature of their working conditions. Furnace tenders, in spite of their dusty occupation, have an extremely low death rate from tuberculosis. I believe the presence of sulphur gases in such occupations may be responsible for this good showing. I do not wish to minimize the fact that workers in the slate, or quartz, or employees in many industries, are predisposed to tuberculosis, but even here a small amount of chlorine or sulphur dioxide may lessen the death rate from tuberculosis.

One cannot mention another industry where dampness is so apparent and where all sorts of bacteria are present as in laundries. Statistics show (5) that among female workers laundries have the lowest mortality due to tuberculosis, and that servants head the list of occupations having the highest death rate from tuberculosis. It must be that the bleach (chlorine) used in laundries is responsible for the healthful conditions of laundry workers. We cannot all work in laundries but we can insist upon a more liberal use of chloride of lime or burning sulphur in surroundings conducive to tuberculosis.

I have shown the relation between coal mining and tuberculosis and have shown the low death rate of miners, furnace tenders, and blacksmiths. I have shown that coal miners and blacksmiths attain a greater age than men engaged in other occupations. This I believe is due to the sulphur gases present in coal mines and around furnaces.

Attention has been called to the low mortality rate due to tuberculosis in Pittsburgh as compared with coast cities. I have proved that sulphur gases are present in the Pittsburgh air to such an extent as to cause rapid corrosion of steel sheets. I have shown that the steel sheets exposed at Pittsburgh were covered with sulphate of iron, the sulphate coming from the combustion of sulphur in fuel. I have also shown that the steel sheets exposed to sea air at Annapolis, Md., are still good and the absence of sulphates on these sheets has been noted. It has also been shown that longshoremen and stevedores have a high tuberculosis mortality.

Attention has been called to the health laden air of Arizona which is contaminated with sulphur gases from smelters and I believe such sulphur air has been responsible for so many cures of tuberculosis.

Finally in making a plea for the compulsory use of burning sulphur in buildings housing consumptives, authentic records show that in occupational diseases tuberculosis is practically nonexistent in industries where sulphur dioxide (burning sulphur) gas is produced.

REFERENCES.

1. Kober, G. M.: Occupation in Relation to Tuberculosis. Reprint No. 562 from the *Public Health Reports*, March 26, 1920.

2. State and Insular Health Authorities 1920 Directory. Reprint No. 605 from the *Public Health Reports*, August 6, 1920.

3. Tuberculosis Among Industrial Workers. *Public Health Bulletin*, No. 73, March, 1916.

4. Chapin, Charles V.: *Sources and Modes of Infection*.

5. Influence of Occupation on Health During Adolescence. *Public Health Bulletin* No. 78.

Treatment of Chorioepithelioma.—Samuel H. Geist (*Surgery, Gynecology and Obstetrics,* May, 1921) summarizes as follows: 1. There are two groups of tumors arising from the chorionic epithelium included under the term chorioepithelioma: a, the typical chorioepithelioma better termed choriocarcinoma; b, the atypical chorioepithelioma better termed syncytioma. 2. There are numerous transition stages between these two groups. 3. A class really not a tumor, but a condition representing an exaggerated reaction to pregnancy, has been grouped under atypical chorioepithelioma. For this class the term syncytial hyperplasia is suggested. 4. The diagnosis from curetted or expelled material is extremely difficult except in the clearcut cases of the two groups. 5. Prognostic significance deduced from the histological structure is doubtful in the transitional types. 6. Indication for operation is set by a positive diagnosis of choriocarcinoma. 7. Indication to wait is determined by a positive diagnosis of syncytioma. 8. In cases of syncytioma, hysterectomy is indicated only by the clinical course. 9. In transitional cases hysterectomy is indicated. 10. Abdominal hysterectomy is the operation of choice. 11. Abdominal hysterectomy, if done early, gives fair prognosis in choriocarcinoma. 12. Abdominal hysterectomy gives excellent prognosis in syncytioma.

Treatment of Acute Rheumatism.—R. Lutembacher (*Presse médicale*, November 9, 1921) maintains that the frequency of recurrence after acute articular rheumatism is due to insufficient prolongation of the salicylic treatment. The condition is analogous to an obstinate septicemia and must receive early, active and prolonged treatment. In mild cases salicylic treatment is often neglected on the ground that the disturbance is too slight to be a true rheumatic fever and is merely pseudorheumatism. As a matter of fact, it is especially in true acute rheumatism that the joint manifestations may be very inconspicuous and evanescent. The author reports good results from intravenous salicylic medication in eight severe cases of rheumatic fever in which there was complete gastric intolerance of sodium salicylate. The salt used had been purified by recrystallization. A one in thirty solution was employed, and a few mils of normal saline solution run into the vein after the drug to obviate induration of the vessel walls. The amount given at each injection was three grams. Two injections a day were given, and attempts were also made to administer the drug by the mouth at night. Gilbert, Coury and Bénard have shown that elimination of sodium salicylate given intravenously is completed only after twelve or thirteen hours. Where the temperature falls after five or eight days, the drug should be continued in large doses for fifteen or twenty days longer, even though the joint involvement has wholly disappeared. If intolerance necessitates temporary reduction or cessation of treatment, the large doses should thereafter be resumed during the first three or four weeks. Later the drug should be further administered. For twelve to eighteen months after the acute illness the author gives two or three grams of sodium salicylate for ten days in each month, either by mouth or injection, in spite of the absence of any recurrence. With this plan recurrences are obviated, at least in the cases under treatment at the initial attack. The infection seems to become more obstinate with each recurrence.

Exohemophylaxis in the Prevention of Reactions after Arsphenamine Injections.—Flandin, Tzanck and Roberti (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris,* November 3, 1921) note that some of the untoward manifestations following arsphenamine medication are syphilitic disturbances demanding further intensive treatment; others are manifestly toxic effects indicating immediate cessation of arsenical therapy; still others constitute a third, more obscure and protean group, comprising reactions from small doses of the drug even in subjects who had previously borne large amounts without harmful results, and frequently appearing as the "nitroid crises" of Milian. Three explanations of the disturbances of the third group have been advanced, viz., colloidoclasic shock, anaphylaxis, and sympatheticoendocrine disturbance. The authors believe these three theories to be neither incompatible nor mutually exclusive; it is possible for them to be combined in the individual case. Desensitization by preliminary administration of small doses of the arsenical drug has not given satisfactory results. Sicard's topophylaxis, which consists of the use of a constricting band in order to confine the reaction to the limb in which the injection is administered, is unsatisfactory in that marked local discomfort may result and the procedure precludes large doses and does not permit of stopping the injection as soon as symptoms begin to appear. For topophylaxis the authors substitute exohemophylaxis, based on the fact that blood is rendered incoagulable even by small amounts of arsphenamine. This procedure consists in drawing into a ten mil glass syringe—already containing the dose of novarsenobenzol to be injected, diluted, e. g., in one mil of distilled water—enough of the patient's blood to fill the syringe, waiting five or ten minutes, and then reinjecting the mixture into the patient's vessel, without previous removal of the needle from this vessel. This method obviates all the objections to topophylaxis and results in a desensitization induced outside of the patient's body. Several months' experience with it in Darier's clinic and dispensary have shown its superiority over all other prophylactic procedures—including sodium hyposulphite, sodium carbonate, sodium chloride, atropine, and topophylaxis—with the exception of adrenalin, which has proved effective in certain cases.

Remedial Massage.—D. J. McDougall (*Canadian Journal of Medicine and Surgery,* June, 1921) enumerates the following noticeable effects that may be produced by massage. 1. The relaxation of spasmodic and tonic contraction of muscles by light stroking in recent fractures and other injuries. 2. The quieting and relaxation of tensely contracted and quivering muscles by steady rhythmical stroking, especially of the back, in functional derangements of the nervous system. 3. The relaxation of spastic contraction by rhythmical stroking and kneading in lesions of the upper motor neuron. 4. The relief of pain by slow rhythmical stroking in neuralgia and neuritis, and the recovery of muscle tonicity by more stimulating movements following an attack of neuritis. 5. The maintenance of tissue nutrition and of joint mobility, and the prevention of deformity in lesions of the lower motor neuron. 6. The recovery of muscle tone, the absorption of effusion, and the strengthening of joint supports following joint inflammations. 7. The maintenance of joint and muscle mobility in the treatment of recent sprains and dislocations. 8. The reduction of edema by deep stroking and kneading of parts approximate to the swelling. 9. The relief of labored heart action, the lowering of blood pressure, and the building up of compensating hypertrophy by stroking and muscle kneading and joint movements in the treatment of valvular disease of the heart. 10. The stimulation of the lung tissue and the dispersal of congestion in the period of relaxation following pleurisy and influenza. Percussion and vibration over the thorax is the movement used. 11. Improvement of digestion, absorption, and elimination of feces in visceroptosis, constipation, indigestion and following parturition and abdominal operations. 12. In the treatment of constitutional diseases such as anemia, gout and rickets, and in the period of convalescence following fevers material assistance may be given by the use of general massage to improve tissue metabolism, and to relieve abdominal symptoms.

Nervous Complications in Rubella.—R. Bérard (*Bulletin et mémoires de la Société médicale des hôpitaux de Paris,* November 10, 1921) witnessed simultaneous epidemics of measles and rubella in a military hospital at Versailles, the former comprising 168 and the latter 291 cases. The cases of rubella were featured by a polymorphic eruption, intense redness of the throat, marked glandular enlargement, absence of fever, of coryza, and of pulmonary manifestations, and slight conjunctival redness. Thirteen cases of nervous complication were observed in the rubella series. Four of these showed an abrupt rise of temperature to 39.5 or 40° C. on the sixth or seventh day of an apparently mild rubella, with headache and definite Kernig sign. Lumbar puncture showed clear fluid under high pressure, with fifteen to twenty-five lymphocytes to the cubic millimetre. These manifestations disappeared in two days. In three other cases there were similar disturbances lasting three days. In three more, after apparent recovery from the nervous disturbance in forty-eight hours, there was a recurrence for one day on the twenty-fifth day in the first instance, retention of urine in the second, and persistent slow pulse in the third. The eleventh case showed intermittent meningitis with a temperature curve simulating malaria; the twelfth, meningomyelitic involvement, with Landry's paralysis and death from bulbar disease, and the twelfth, herpes zoster beginning on the eighth day and disappearing a week later. The meningeal disturbances were generally associated with marked excess of sugar in the spinal fluid, without any excess of albumin.

Primarily Chronic Urethritis. — Œkonomos (*Paris médical,* September 10, 1921) holds that in a few instances urethritis is chronic from the start. He cites the case of a medical student who, twelve days after coitus, showed a morning drop of pus without the least pain either during micturition or erection. Microscopic examination showed only saprophytes and never any gonococci, but the urethritis proved rebellious owing to complication by chronic prostatitis, and yielded only to an autogenous vaccine. Since observing this case the author has collected six more cases of primarily chronic urethritis, in all of which a preceding, more or less remote acute urethritis was carefully excluded. In three of these cases the gonococcus was found, and in the others, the streptococcus, the staphylococcus, and a diplococcus. In such cases the onset is much slower and more insidious than in acute urethritis, the interval between coitus and the onset being generally over six days. In one instance the incubation period was nearly four months. The average duration of the disorder is six months. The treatment is that of ordinary chronic urethritis. In view of the importance of the general state of health in the primarily chronic cases, however, constitutional treatment should be given the most attention. Cinchona and iron may be prescribed with advantage in anemic patients; iodides and codliver oil to patients of the lymphatic type, and arsenic and alkalies to those of the arthritic and herpetic type. Saline and sulphurous baths, stimulating friction of the whole body, and a prolonged stay in a health resort may be availed of according to indications.

Treatment of Malaria.—R. W. Mendelson (*Military Surgeon,* May, 1921) states that nothing new can be added regarding the treatment. Satisfactory results are obtained in the native by the proper use of quinine without recourse to the more recent specifics, such as the organic compounds of arsenic and others. This is not always the case in the white man who has been in the country some time and has been doping himself more or less continuously with quinine. Seemingly the native is virgin ground for quinine the same as the white man is for the parasite. In conclusion, suffice it to state that it always pays to treat every patient as suffering from malaria until the said patient has left the confines of the hospital. This is a dogmatic statement, but will be appreciated by medical men working in a malarious country.

The Leucocytic Blood Picture as a Symptom of Malaria.—W. A. Kop (*Journal of Tropical Medicine and Hygiene,* November 1, 1921) notes that in almost every clinical description of malaria an increase of the large mononuclear cells is mentioned as a constant manifestation, which may be of diagnostic use when no parasites can be found. Many authors, however, make no distinction between large mononuclears and large lymphocytes, although the significance of these two forms is quite different. Research by the writer in a number of cases of malaria in Java, comprising both Europeans and natives, showed that, taking into account only the true large mononuclear and transitional cells, there is not often in malaria mononucleosis of a degree suitable for diagnostic purposes, viz., over fifteen per cent. A shift to the left in the Arnetti count of the neutrophile blood picture was, on the other hand, found to be a most constant sign of malaria, persisting for a considerable time after the fever subsided. The fact that this persistence after the fever is not seen in most other febrile diseases makes this a useful diagnostic indication in malaria. It will be of especially great value in considering the results of treatment. As long as the patient has a shift to the left there is danger of a relapse. When the shift increases a relapse may be imminent. It is suggested that this method be used in comparing the efficacy of different treatments for malaria.

Disposition of the Uterus after Salpingectomy Where It Is Desirable to Preserve Menstruation.—Carey Culbertson (*American Journal of Obstetrics and Gynecology,* November, 1921) regards ventral fixation of the uterus as having objections which render it an undesirable procedure in association with removal of both tubes. Round ligament shortening is also disadvantageous under these circumstances, and should be reserved for the simpler uterine displacements where pregnancy is to follow. Reduction of the size of the uterus by removal of its entire fundus is a ready method of disposing of the organ after salpingectomy where, particularly in young women, it is desirable to preserve menstruation. Such defundation is a logical procedure not only in operating for the cure of infectious processes, but also for simple sterilization, ectopic pregnancy, ovarian cystomata, and like conditions. Its only contraindication from a technical point of view is procidentia uteri.

Treatment of Epithelioma of the Lip.—W. E. Sistrunk (*Annals of Surgery*, May, 1921) asserts that a review of his cases shows that the percentage of cures following operation in which the glands are involved are much lower than when the operation was performed before the glands became involved. The percentage of from five to eight year cures when the glands are involved is almost identical with that obtained in cases of cancer of the breast when the glands are involved. The percentage of local recurrences seems too large. This probably could be avoided to a certain extent by a wider removal of the growth and the use of radium after operation. Rapidly growing epitheliomas, and especially those growths with a marked inflammatory reaction surrounding them, are best removed with the actual cautery without attempting to perform a plastic operation at the time. In cases in which the glands have liquefied, broken down, and extensively involved the surrounding tissues no relief can be expected. Such cases are probably best treated by means of radium and x rays.

Treatment of the growth by means of radium and the x ray without removal of the glands does not seem a radical procedure. We have seen a number of patients with an extension of the malignancy later into the glands while the primary lesion remained cured. There is no doubt that radium often destroys the growth, but such a procedure is almost identical with the methods in which the growth is removed with pastes or by local excisions. We know from experience that although there may be no local recurrence of the growth following the latter procedures, in from twenty per cent. to thirty per cent. of the cases, metastasis occurs later in the submaxillary and submental glands.

Is Circumcision a Barbarous and Unnecessary Mutilation?—Abraham L. Wolbarst (*Medical Review of Reviews*, August, 1921) discusses the subject of circumcision as a hygienic and prophylactic measure. His paper is a reply to a previous writer who opposed the practice of circumcision on the ground that it was a barbarous and unnecessary mutilation, and recommended dilatation as a substitute. Wolbarst's conclusions are as follows: There is no evidence to show that the foreskin serves a useful, even necessary purpose, but there is every reason to agree with Ricord, that it is a useless bit of flesh to civilized man. Retractability does not confer any specific virtue or immunity against disease. Circumcision is perhaps the most beneficent single measure ever devised for sanitary purposes in human beings. It is not a barbarous and unnecessary mutilation. It is the paramount agency in genital cleanliness and hygiene. It is decidedly prophylactic against infection with venereal ulcers. It diminishes local complications in the presence of venereal disease. It makes balanitis impossible, and thereby impedes the development of venereal warts, herpes progenitalis and epithelioma. It diminishes the tendency to masturbation, convulsions and other reflex phenomena of local irritation. It eliminates erosive and gangrenous balanitis—the fourth venereal disease, socalled. It abolishes phimosis and paraphimosis with their attendant complications and dangers. It renders venereal ulcers immediately visible, and therefore encourages early therapeutic measures; as a corollary, it prevents the spread of venereal disease through female contact with concealed and unrecognized lesions within the preputial cavity. And, lastly, it is the moral duty of physicians and hygienists as an earnest and sincere contribution to the hygienic development of the race, in general, and to the suppression of venereal disease and cancer in particular, to encourage the practice of circumcision in all male infants, whether the foreskin is retractable or not.

A Substitute for Artificial Pneumoperitoneum as Applied to the Kidney.—H. H. Carelli (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris*, November 3, 1921) points out that artificial pneumoperitoneum is less serviceable in demonstrating the kidney than the liver and spleen, the former being an extraperitoneal organ. He therefore employs the following procedure for the kidney: After having taken a preliminary x ray picture, with metallic indicators over the landmarks, the point exactly overlying the transverse process of the second lumbar vertebra is determined. With aseptic precautions a fine platinum needle ten or twelve centimetres long is then introduced to this transverse process and its direction then slightly changed to avoid the bone. As soon as the manometer connected with the needle shows oscillations, the needle is known to be in the perirenal fatty tissue. Chemically pure carbon dioxide gas is then injected into this tissue with a Forlanini apparatus, causing an artificial emphysema. Absorption of the gas is so rapid that the x ray picture must be taken as soon as the emphysema has been produced. The slight lumbar discomfort experienced as a result of the injection passes off in less than half an hour. The amount of carbon dioxide injected ranges between two hundred and six hundred mils.

Determining the Surface Area of Wounds—Beverley Douglas (*Annals of Surgery*, June, 1921) presents the following conclusions: 1. the gravimetric method of determining the surface area of wounds consists of the following steps. The usual tracing of the exact pattern of the wound is taken by covering it with a transparent flexible sheet. This pattern is then transferred by means of tracing paper to a sheet of ordinary, accurately cut, bond paper, the weight of which per square centimetre is known. By weighing the cutout pattern on an ordinary chemical balance and dividing the result by the constant, the exact area of the wound is obtained in square centimetres. 2. The method requires only apparatus which is ordinarily found in hospitals, laboratories, and drug stores. It is simple and requires ordinary skill and care to obtain accurate results. 3. The maximum errors of the gravimetric method are so small that they are, for practical purposes, negligible. They are less than the intrinsic error due either to tracing the wound surface on protective or to retracing this pattern on bond paper. In practice it is as accurate as the planimetric method. To those interested in following wound healing, infection, antisepsis, and similar problems where a simple and yet accurate means of estimating wound areas is necessary, the gravimetric method offers many advantages over the planimetric method.

Proceedings of Societies

ASSOCIATION OF AMERICAN PHYSICIANS.

Annual Meeting Held in Atlantic City, N. J., May 10 and 11, 1921.

The President, Dr. W. S. THAYER, of Baltimore, in the Chair.

(Concluded from page 120.)

Yaws.—Dr. W. L. Moss and Dr. H. G. BIGELOW (by invitation) presented an analysis of 1,046 cases of yaws studied in Santo Domingo. Yaws was also called bubo and frambesia, and its distribution was throughout the tropical world. Some workers considered it identical with syphilis, but Dr. Moss and Dr. Bigelow believed there was a distinct etiology, as syphilis could also develop in a yaws patient. The disease was due to Treponema pertenui. It had primary, secondary and tertiary stages, but they were not so clearly defined as in syphilis, and were likely to overlap. Primary stage: two to four weeks' incubation, with malaise, pains, headache, fever. There was a papule with yellow secretion, a crust formed and fell off, leaving an ulcer. Secondary stage: one to three months after the primary; generalized eruption of granulomata with systemic symptoms, which persisted three to six months or a year; scabs fell off, leaving pigmented scars. Tertiary stage: might occur years after the secondary; gummata, ulcers leaving large scars; bone lesions were common. Mortality was low. Treatment consisted of the administration of potassium iodide and sodium bicarbonate. Neosalvarsan in two or three doses affected a cure in many cases. Ages of patients varied from one month to sixty years. The initial lesion was usually extragenital, in contrast to that of syphilis, and twenty-five per cent. occurred in patients under five, so that no amount of sexual precocity would account for this early occurrence. It might be transmitted by some insect. The mucocutaneous or moist surfaces were chiefly affected.

Plaguelike Infections.—Dr. RICHARD P. STRONG and Dr. W. T. COUNCILMAN, of Boston, believe that the examination of ten thousand rats to one hundred thousand inhabitants was sufficient to obtain evidence of a plague. The rat served as the basis of investigation. Plaguelike organisms, resembling Bacillus pestis, were found in rats, including, 1, the group of hemolytic septicemic organisms affecting chickens, rabbits and swine; 2, pseudotuberculosis; 3, typhoid organisms, as Bacillus typhi murium and the hog cholera bacillus. One organism that was pathological for animals was Bacillus toulerence, a minute, round or rodshaped organism, which caused necrosis and proliferation of the vascular endothelium, resulting in congestion of the large lymphatics. Autopsy showed rigor mortis and a granular surface of the liver like pepper grains. This was so characteristic that with the naked eye one could distinguish the lesions.

Objects and Method of Diet Adjustment in Diabetes.—Dr. R. T. WOODYATT, of Chicago, said that in spite of the work of Allen and Joslin there were many varied opinions as to diabetic diets. In some cases the strictly limited diets gave good results. One characteristic of diabetes *per se* was inability of the patient to use glucose in excess of a certain amount. The pancreatic secretion was altered in this respect. The quantity of food which might be normally oxidized by the body was determined by the quantity of glucose which was oxidized. Therefore glucose must be brought within the limits of the body's power. In a fasting state the body used endogenous supplies for its nutrition, even on a maintenance diet, endogenous food was used. There were thousands of combinations of fat, protein and carbohydrate, but all carbohydrate must become glucose before it could be oxidized. One hundred grams of protein would yield five per cent. glucose, and one hundred grams of fat would yield ten per cent. glucose, and in giving these elements one must watch for the critical point at which acetone appeared. Carbohydrate must be adjusted to the highest possible level, because it would carry more fat than protein would and therefore spared protein. If protein was added, one must remember to subtract calories. The addition of fat reduced the quantity of glucose going into the metabolism. Cream was very useful in this respect and spared protein.

Familial Diabetes.—Dr. H. R. M. LANDIS, of Philadelphia, said that there was a certain hereditary tendency in diabetes, but familial diabetes was not common. In the family studied there were ten children in the family, nine living. There were four blonds, free from symptoms, and five brunettes, who all had glycosuria. The patient seen was an intelligent woman, who had applied for life insurance and was rejected on account of sugar in the urine. The next sister had had failing health for some months, and was found to have much sugar. This tendency seemed to have skipped one generation, and to have appeared in grandchildren. There seemed to have been a distinct hereditary and familial tendency in this case.

Blood Sugar Tolerance Test as an Aid in the Diagnosis of Gastrointestinal Carcinoma.—Dr. JULIUS FRIEDENWALD and Dr. G. F. GROVE, of Baltimore, stated that the curve of sugar tolerance was different from that of carcinoma of other parts of the body. It was rather distinctive, so that it might aid in the differential diagnosis between carcinoma and other disease of the gastrointestinal tract. Examination of curves showed: 1, normal curve, two hours after one hundred grams glucose, fell to normal; 2, atypical normal curve (achylia gastrica) fell slowly after two hours; 3, intermediate curve, blood sugar high, associated with carcinoma of other parts of the body; 4, gastric carcinoma curve, high blood sugar. Forty-six cases had been studied. The results showed that cancer curves could be distinguished from cancer of other parts of the body.

Pituitary Extract and Water Balance.—Dr. L. G. Rowntree, Dr. E. E. Larsen and Dr. J. F. Weis, of Minneapolis, studied water balance and water intoxication in fifteen cases of diabetes insipidus. There was increase of thirst, polyuria and polydypsia. Studies were made to determine whether thirst was the primary symptom. In some cases thirst preceded polyuria. Pilocarpine did not relieve the thirst, neither did cocainization of the mucous membrane. Pituitary extract had no effect on water excretion, neither had spinal puncture. The blood showed increase in plasma, volume and molecular constituents. They thought there was hydremic plethora with increased renal threshold. In dogs with water intoxication violent symptoms were shown, with convulsions and frothing, but the animal recovered in a few days. Simply forcing water led to water intoxication. There was no evidence of edema of the brain.

Relation of Acromegaly to Thyroid Disease.—Dr. James M. Anders, of Philadelphia, presented a statistical study of the relation between acromegaly and thyroid disease. He said that hypoactivity of the anterior hypophysis occurring after union had taken place was the generally accepted theory. He believed that perversion of secretion, rather than excess, was the rule. Usually there was dilatation of the sella, with persistent thymus. Neoplasms were of various kinds, adenoma, sarcoma, cystic degeneration, etc. Sometimes the hypophysis was normal in every respect, so that disturbance might occur without any microscopic or macroscopic lesions. These were ductless gland neuroses and were rather rare. There might also be hypertrophic enlargement or even destructive lesions, without acromegaly. Removal of the thyroid was followed by hypophyseal enlargement; also in hyperthyroidism there was enlargement of the hypophysis, so that it appeared that the glands could function by compensation up to a certain point. There was also a certain clinical connection between myxedema and hypophyseal disease. The anterior hypophysis was supplied by sympathetic nerve fibres, while the posterior was not, and this sympathetic innervation would explain the influence of the thyroid gland.

The Blood in Tetrachlorethane Poisoning.—Dr. George R. Minot and Dr. L. W. Smith, of Boston, said that this chemical could produce serious or fatal hepatitis. Industrially it was used for airplane burnishing, for films and in artificial silk. The poison acted particularly on the blood and on the liver. The symptoms were very ill defined. The patient was fatigued, had slight gastrointestinal symptoms, constipation, perhaps jaundice. The liver was palpable and tender. The onset was insidious. Of sixty-eight persons exposed, twenty-one had poisoning. There was a definite blood picture, progressive increase of the large mononuclears, reaching as high as forty per cent. There was a slight secondary anemia. The blood picture could be discovered before symptoms appeared. Respiratory affections seemed to lower the resistance of the workers. When there were blood changes and symptoms, this indicated removal from work. Recovery was gradual. Persons who had once been affected were more sensitive to the poison in future.

A Method for the Study of Early Arterial Changes.—Dr. Harlow Brooks, of New York, believed that the diagnosis should be made early, and this was impossible except on two grounds: suspicion of trouble, and examination of the retinal vessels. The latter was difficult for those inexperienced in ophthalmoscopic methods. Examination of the conjunctival vessels was much easier, as these vessels represented the intracerebral circulation. They appeared bluish white on the background. The eye must be near the lens, and the examination only took a few minutes. If one had a corneal microscope, technical skill was required, but the work was fascinating. The anatomical and physiological changes could be seen. The changes appeared early in hypertension, even when transitory. The vessels looked like cords. There were often zones of obliteration and formation of small sacular aneurysms.

Estimation of Quantitative Variations in the Vibration Sensation.—Dr. E. J. Wood, of Wilmington, N. C., began this study at Guy's Hospital, as a continuation of Sims's work. The vibration sensation was first studied in the Gradinego triad. An attempt was made to make clinical application of vibration in routine neurology. The instrument used was introduced by the ear men in England. The prongs of the instrument were separated when a sharp blow was struck. Normal range was studied in a hundred people without neurological conditions. Tabes was then studied and a diminution in the vibratory response over the sacrum was found. Tests were made over the internal malleolus, the external malleolus, tibia, sacrum and sternum. This sacral diminution in tabes appeared before Argyll Robertson pupils were evident. Dr. Henry Head suggested that there would be definite relationship found between this test and serological findings, that this would be of earlier diagnostic import, and would do away with the necessity of frequent lumbar punctures. This was more than we were prepared to say at present.

Novel Effects Produced by Stimulating the Nerves of the Liver.—Dr. W. B. Cannon, of Boston, and Dr. J. E. Iridil and Dr. P. E. Smith, presented a paper on this subject in which they stated that the denervated heart could maintain its function as long as the temperature was uniform. Stimulation of the hepatic nerves increased the rate of the denervated heart. This rise was due to some substance given off by the liver itself, probably amino acids supplied by the intestinal tract, and, taken into the liver, were given off again.

New Evidence of Thyroid Secretion Following Stimulation of the Cervical Sympathetic.—Dr. Walter B. Cannon, of Boston, and Dr. P. E. Smith, believe that if the cervical sympathetic nerve was stimulated with the thyroid nerve in, adrenalin would raise blood pressure more quickly. This did not occur if the thyroid had been removed. By use of the denervated heart, it was possible to get evidence of control of the thyroid and to get reflex response. With slight stimulation of the gland for two minutes the heart rate was considerably increased after ten minutes. The submaxillary did not cause this effect. It made no difference whether the adrenals were removed or not.

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Miscellany.

Acute Partial Enterocele.—Charles F. Sawyer (*Surgery, Gynecology and Obstetrics,* July, 1921) states that the condition of acute partial enterocele is not so rare as formerly considered and may occur at any abdominal hernial site. Symptoms are milder than in other strangulations and lack uniformity. The fact that pain is referred to the epigastrium with little or no localization at the hernial site is noteworthy. The diagnosis must be based on history of old hernia usually, symptoms of strangulation without the constipation in many cases, the lack of abdominal distention, and the small tumor mass or none at all at hernial site. The prognosis is unfavorable because of late diagnosis and early gangrene of gut. The treatment is operative at earliest possible moment.

Chloroma, with Special Reference to Ear, Nose, and Throat Manifestations.—W. W. Pearson (*Annals of Otology, Rhinology and Laryngology,* December, 1920) states that chloroma is a rapidly growing and very destructive new growth, occurring most frequently in the young and showing a predilection for bone. It appears to attack the male in excess of the female. The condition usually manifests itself by greenish looking growths in the orbital or temporal region. The average duration is three or four months. Besides the local manifestations of swelling of the face, painful exophthalmos and tenderness over the affected areas, a careful physical examination will elicit a rapidly increasing anemia, cachexia with fever, and evidence of a hemorrhagic diathesis. Decided emphasis is placed by the author upon the importance of making a differential diagnosis, as attention is especially called to the possibility of chloroma being mistaken for an abscess. Reference, however, is made to two cases having been admitted to the hospital as septic diphtheria.

A Sign of Value in Early Phthisis.—Selig Simon (*Journal of the Missouri State Medical Association,* January, 1921) has observed that in normal adults the pulmonary second sound is never louder, if as loud, as the aortic second. When on examination the pulmonary second sound shows a definite accentuation without cardiac enlargement, it is well to bear in mind the possibility of phthisis.

Ice Water Bath in Complement Fixation for the Wassermann Reaction.—W. W. Duke (*The Journal of Laboratory and Clinical Medicine,* April, 1921) by using an ice water bath instead of the ice box, was able to shorten the time of incubation to one hour, without materially affecting result of test.

Cancer of the Larynx.—F. Holt Diggle (*Practitioner,* May, 1921) gives the following warnings: 1. Be suspicious of a persistent hoarseness in a person around fifty years of age. 2. Regard as serious slight discomfort in swallowing of no known origin, especially in a female. 3. Do not expect early and rapid glandular involvement. 4. Do not exclude malignancy because of absence of sanious expectoration. 5. Regard as malignant until otherwise settled, especially in a patient around fifty years of age, unilateral congestion of a vocal cord and a papilloma on a vocal cord. Sluggishness in movement of the cord will increase one's suspicion.

Famine Dropsy as a Food Deficiency Disease.—J. A. Nixon (*Clinical Journal,* May 4, 1921) defines famine dropsy, also called hunger edema, and war edema, as a form of dropsy associated with bradycardia, polyuria, and asthenia. It occurs as the result of prolonged underfeeding, and its appearance is accelerated by physical exertion and exposure to cold. It is a condition independent of renal or cardiac disease, beriberi, scurvy, or pellagra. The evidence at present available indicates that the deficiency is not that of a single food factor, but rather a combined deficiency in protein and in calories. There is a possibility that an excessive intake of fluid in the diet is essential to the production of the edema.

Multiple Fluid Collections in the Chest in the Course of Therapeutic Pneumothorax.—Barnett P. Stivelman and Joseph Rosenblatt (*American Journal of the Medical Sciences,* February, 1921) found multiple fluid collections in five out of thirty-two cases of hydropneumothorax. This condition could not be detected without the aid of the x ray. Two or more hydropneumothorax pockets may be produced as a result of attempts to induce pneumothorax at different levels of the chest or a localized spontaneous pneumothorax may occur adjacent to a pocket of artificial hydropneumothorax. The most important factor in the causation of this condition is pleuritic adhesions which spread out in hammock like fashion from the visceral pleura across the pneumothorax area to the chest wall. These adhesions may be present before the induction of the pneumothorax and may occasionally be the result of a thickened interlobar septum, or they may be newly formed as a result of organization of the exudate. The coexistence of a fluid containing cavity with a hydropneumothorax may also give rise to multiple fluid levels.

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A Discussion of Angina Pectoris

By The RT. HON. SIR CLIFFORD ALLBUTT, K. C. B., F. R. S.,

London.

In the year 1893, at a meeting of the branch of the British Medical Association at Yarmouth, I read a paper on angina pectoris—a subject on which I had been thinking for many years. Then I proposed for the first time that the lesion was not primarily cardiac, but in the large majority of cases aortic; and that death was due not to heart failure implicit in the disease but to a secondary inhibition set up by the pain, or kindred afferent influence; an inhibition the more effectual the worse the condition of the myocardium. Thus the prognosis as to survival was far better in the younger subjects of aortitis—so long as the coronary vessels were patent—than in the elderly in whom the heart was impaired. My audience scoffed at this hypothesis; my arguments were absurd, outrageous, childish; a curious instance in the human mind of the grip of old dogma, and intolerance of the new. For consequently, almost insensibly, with and without acknowledgment, opinions changed. Many disputants began to argue, others climbed on the fence; some opened their minds to the question; a few definitely accepted the new doctrine. Some protested that in certain cases at any rate angina pectoris might after all be cardiac, forgetting that I had pointed out, again for the first time, precisely when and how the malady might be cardiac, and had given instances thereof, clinical and pathological.

Since I published the section on angina in my *Diseases of the Arteries* the conversions have become many. As it was in the United States that I found my colleagues more openminded than elsewhere (I may refer for instance to the discussion of my views by American physicians of the highest distinction in the Institute of Medicine at Chicago on March 28, 1918) I was ready to respond to a request from the United States to report on the more recent history of the problem. The late Dr. Murphy, himself a victim of the disease, was perhaps the first in America to accept frankly and unequivocally and warmly to advocate my interpretation. At Chicago, Professor Ingals went a long way to meet my doctrine; and, after a masterly presentation of it, Professor Babcock said that my position "was a very good one." In Vienna, on the strength of many necropsies, Professor Wenckebach writes that he "is absolutely with me." In France, Wybauw, Dieulafoy, Vaquez and others of such standing, are likewise converted; Vaquez adducing corroborative evidence from a long series of ray diagrams. Osler was almost persuaded; the more when, searching in his library, we found that Corrigan had made some forecast of a like hypothesis. But in England, where the prophet has less honor, converts are fewer; yet so cautious and distinguished an authority on the subject as Sir Douglas Powell admits that "certain clinical characters of angina pectoris point to its being a pressure symptom in a tender vessel, as has been pointed out by Clifford Allbutt." (1). And so on, not to multiply examples, for many other witnesses, some I have mentioned to excuse my pertinacity.

Many authors sitting on the fence and unable to tear themselves away from a long habit of thought, raise difficulties of a more or less ingenious kind, such as distinction between angina and "aortalgia," which I may deal with incidentally. Now, I will dwell briefly upon some recent observations on the causes of angina.

ACUTE INFECTIOUS AORTITIS.

Among the causes of angina I quoted in previous papers the observations, especially of modern French writers, on the injurious incidence of infections on the aorta, observations which have been left in some doubt. But further evidence of acute infectious aortitis is coming in; as for instance, in an article on this lesion by Dr. George Brown, of the Mayo Clinic (2). Of these kinds of aortitis that of influenza is particularly interesting. Sir Douglas Powell has published reports of two cases with anginal symptoms in both, as Sansom, Marmorstein, myself and others have done. Brown gives two cases, with x ray diagrams. He reports also a case of aortitis in rheumatic fever, a condition which had been described by myself and by certain French physicians, as I stated in my book. Since the attention of pathologists has been called to it, this aortitis has come more into notice. In both of Brown's cases classical angina symptoms, including the deathlike sensations, were present. Dr. Poyntin, whose experience of rheumatic fever is large, de-

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scribes rheumatic aortitis as not infrequent, and often associated with classical angina; yet in three of his cases the symptoms were regarded as functional—pseudoangina—if not indeed fictitious, for the functional element was so prominent. Two of these patients protested by "dying unexpectedly." Time after time one has argued that, especially in young and labile persons such as these, pain and distress may well set up wider and larger waves of functional reactions.

Dr. Brown discusses the incidence of many other infections attended with aortitis, on which I must not tarry here. One of his cases of diphtheritic aortitis presented anginal symptoms, including dread. The patient recovered but the diagnosis and the recovery were confirmed by successive x ray diagrams. In these cases the aorta lengthens; and Brown points out that in the x ray picture "where the arch curves over to make the descending aorta, a clear portion of the lung is normally visible between the aorta and the clavicle; but in the early stages of aortitis this clear area is absent, and instead the aortic shadow is seen posteriorly, or even above the shadow of the left clavicle." He adds that his observations "seem to substantiate Allbutt's contention that the symptom syndrome of angina pectoris is due to disease of the aorta itself." On the other hand the clinical signs may be slight or absent; this depends upon the depth of penetration of the lesion toward the investment of the vessel. Klotz (3) has testified likewise to rheumatic aortitis. In many, indeed in most of these cases in young persons, the coronary arteries are clear. On the frequent occurrence of syphilitic aortitis I need not dwell; its features have become common knowledge. I summed up our recent knowledge of the process with histological drawings in three cases by Sir German Sims Woodhead and his staff at the meeting of the British Medical Association, in July, 1921. For other kinds of infection of the aorta, I must refer to Dr. Brown's and other papers, but I may allude to a carefully studied case of syphilitic aorta in the Hôpital St. Antoine:

SYPHILITIC ANGINA.

CASE I. F., aged thirty-seven, probably syphilitic. Anginal attacks were frequent, affecting left ulnar, arm, neck and jaw. Patient died in fourteen days from rapid edema of the lungs, living long enough for full records. The usual hyperesthetic spots were detected. X rays showed dilated aorta. Blood pressures were normal or influenced only by pain. Sometimes under the pain systolic pressure rose to 190-200; but on cessation of seizure the pressure fell again, sinking to normal in an hour or two. Postmortem examination showed the internal aspect of the aorta to be smooth, no ulceration, no vegetation. But under the intima there were semiopaque yellowish patches, of irregular outline but discrete. The valve was intact; coronary arteries were quite normal and permeable throughout, as was seen on slitting and cross sections. The myocardium was normal; no infarct; kidneys were normal to the naked eye and the microscope.

In this case the pulse was normal except that during the pains the rate rose more or less. In many cases it is retarded a little, but all careful observers admit that the pulse in angina is, on the whole, indifferent. No one emphasizes this more clearly than Walsh. Mr. Verdon has taken jugular tracings and electrocardiograms during attacks with negative results. How then is this independence consistent with phases of enfeeblement of the heart, fatigue of the myocardium, cramp of the heart, or disequilibrium of heart work and coronary supply.

CORONARY THROMBOSIS.

Notwithstanding, as I have said, angina may be of cardiac origin, but this happens only when its investments are inflamed or stretched, as in pericarditis, or coronary thrombosis. Dr. Herrick, at the Chicago meeting, gave an interesting description of coronary thrombosis. The well known experiments of Cohnheim and Rechberg (4) and of Porter and others proved that ligation of these arteries gives rise at once to cardiac arrhythmia, fibrillation of the ventricle, and stoppage in diastole; and everyday experience tells us how gradual obliteration of these vessels by disease weakens the heart, but more insidiously, and painlessly. Many of us in England will recall the death of one of our colleagues, himself a master in cardiology, which happened suddenly while he was examining a patient. The coronary arteries were found to be—both of them—almost occluded by atheroma. Yet he had never suffered any pain; the cardiac investments, the seat of the sensory afferents, had not been inflamed or stretched. In thrombosis or embolism this is not so; a pericardial rub is often heard; and in case of early death the affected parts are found injected and swollen.

At the Chicago meeting Dr. Herrick (7) described these acute cases, and defined the diagnosis between these and ordinary angina which, in my view, is dependent on aortic lesion. Dr. George Graham has sent me the notes of such a case, which he saw in St. Bartholomew's Hospital. While driving his van the patient was seized with intense pain and was taken at once to the hospital. The pain was in the chest around the heart, and in some degree in the left arm. He could not rest but rocked himself about in the chair. His pulse then showed no sign of disorder. In a renewed attack he died. Dr. Graham dismissed the diagnosis of angina, "because the man moved about so much." A postmortem examination by Sir T. Horder, showed, briefly, that about half an inch inward from the orifice of the left coronary was a small recent thrombus tightly adherent to the wall, and extending some seven mm. down the distally quite occluded vessel. Except for the presence of a small spot or two of atheroma the aorta was normal.

It is remarkable that in this case, at any rate on admission, the pulse was little affected; in other recorded cases of coronary thrombosis the pulse has been thrown into great disorder; so much so as to aid in the differentiation of this accident from ordinary angina. Hochhaus (8) reported four cases in two of which he made the differential diagnosis during life. In all four the pulse was rapid and arrhythmic, in which respect these cases usually differ from uncomplicated angina. Other diagnostic points are: Pain no less severe but more diffuse and continuous and more about the region of the heart (not so distinctly substernal); restlessness—as contrasted with the stricken stillness of angina; dyspnea and frequently palpable dilatation of the heart and audible pericardial friction.[1]

The still frequent allusion to dyspnea, especially in its paroxysmal form, as a symptom of angina makes it needful to say that, if present, it means not angina but, if the case be one of angina at all, then some complication of it. And, by the way, even students of heart diseases are apt to speak of dyspnea as an early sign of cardiac frailty, whereas it is an early sign that, however imperceptibly, the case has entered on its last stage. Indeed the name of angina, as Professor Ingals well says, is used too loosely. He objects, as I have done, to the adjective precordial; the characteristic pain being substernal. Aches and oppressions about the cardiac area suggest rather disease of the heart itself. The pain in mitral stenosis attributed by Head (9) to overstretch of the auricle is not, in my experience, of the anginaform kind observed in a few of these cases and probably due to some inflammation about the base of the heart, but the common, dull, wearing, submammary ache. It is impossible now to deal with the large diagnostic question of the pseudoanginas; I can only repeat that frequent as they are, too often this name is given to cases which prove to be only too real. I may remark, by the way, that Dr. Leonard Kidd (10) says that signs of irritation or paresis of the phrenic nerve are not frequent or prominent in angina; that it is in the pericardial cases with mediastinitis, as also of course in aneurysm, that the recurrent is likely to be ensnared.

ARTERIAL PRESSURES IN ANGINA PECTORIS.

A few words must be given to arterial pressures in angina pectoris, as opinions are not clear on this subject. If, as I assume for the large majority of cases, the angina depends upon an aortic lesion, then of course the higher the aortic pressure the more will the vessel suffer. And again the less the vulnerability of the vessel the higher the pressure required to cause the distress. But even Pal had to admit that high tension is not an essential feature of angina. Moreover, as we have seen, the pain itself, any pain, will, or may, drive up the pressures, at any rate the systolic; so may any other emotion even in healthy and stable persons. In the majority of cases the aortic lesion is sufficient to be painful under ordinary pressures, or even below them. How emotional causes, by temporarily raising systolic pressure, excite the attacks is only too well known; so that with the wearing down of superior control even the opening of the chamber door may precipitate a seizure. But, leaving these ordinary cases for those of antecedent high pressures, in many of these the aortic lesion is more or less the consequence of the strain, and may be no more than under moderate pressures might heal or recover toleration. No doubt in such cases the vessel is more or less atheromatous to begin with and so more susceptible.

But, where presumably the aorta is not much degenerated or not so profoundly altered, an angina due mainly to excessive pressures may subside as these are moderated; and the prognosis *qua* angina may be not bad. For instance, in a man aged sixty-eight years who had consulted me before for hyperpiesis, an attack—and a pretty severe one—seized him one night without warning during sleep; "a bolt from the blue" as he called it. This attack occurred two or three years ago, but under treatment for the hyperpiesis it never reappeared. This was an usually clearcut case, yet in its degrees this interdependence of pain and high pressures is often to be observed, and is no small factor in prognosis. By reduction of arterial pressures relief of the angina is possible, or may be probable, if repeated attacks have not weakened superior control. In these cases dyspnea is a common incident, but is due to the yielding of the left ventricle.

PATHOLOGY OF ANGINA.

In passing on to a few paragraphs on the pathology of angina, I may say that Professor McCrae (10) agrees that the "pain of aortitis and of angina are similar if not identical." Desiring a differential diagnosis, he found this so difficult that he had to be content with degrees of pain and radiation, degrees, however, almost infinite in variation. I ought to add that he considers aortitis angina as distinct, inasmuch as its tendency is to recovery, that "it is not mortal," because in young persons we assume the angina to be not associated with cardiac degeneration; that it must be aortitic only. In young persons angina is "not mortal," or rarely is so, because of the insusceptibility of the vigorous myocardium to inhibition. Perhaps a sound heart will always defy mortal inhibition; so says Dr. Levy on the strength of experiments on animals. Even syphilitic angina, common as it is, is rarely mortal so long as its victims are free from heart disease; but let the aortic valve be damaged and sudden death becomes almost certain. In aneurysm of the aorta likewise, again common enough (a patient with aneurysm if questioned, however cautiously, will generally remember that he had suffered from sternal oppression and pain, at any rate transiently), death is hardly ever due directly to vagus inhibition, as in the cases of senile or other decay. The angina belongs to the stage of attack on the aorta, with perforation and fall of tension it may cease. Coronary disease with consequent myocardial decay is the determining factor of death in angina, which in itself, however agonizing, is not a perilous malady. And even Pal—to quote him again—admits that angina may occur without any coronary disease.

How the aorta dilates by degrees under stress was shown by Hürthle (11) on animals. Vaquez, in his well known treatise, shows by x rays that it dilates during a seizure of angina, though of course in his cases the vessel was already diseased, and suffered from stresses to which, under the controls of health, it might have been insensible. How a diseased aorta may be persistently dilated in angina without any degree of general hyperpiesis, was well shown in a patient sent to me by Dr. Joss of Rochsale.

CASE II.—A man of forty-seven, in whom and in whose children no traces of syphilis could be found, and whose Wassermann was negative, was seized by angina in severe and classical form. Dr. Barclay, of

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[1] With pericardial angina I have dealt fully in my book. Dr. Graham Steell (5) has published four interesting cases of this disease. He found that some tendency to angina might remain for months after recovery. Sir James Mackenzie's explanation of pericardial angina, that it is due to tension of inflammation of the myocardium, can hardly be accepted.

Manchester, took x ray observations for us, and reported in the first sitting that the aorta was dilated, and so much so as to show no pulsation. The heart showed no morbid change either under the rays or to ordinary examination; no morbid quality of second sound at the base. Under careful treatment by Dr. Joss the condition improved so that in later sittings Dr. Barclay was able to demonstrate pulsation again in the vessel and reduction in its size. The last report was that the picture differed in no way from the normal pattern. The arterial pressures, systolic and diastolic, had remained normal all through (unless perchance there was some systolic rise during an attack).

Vaquez reports that the aorta may be diseased and yet show no change to the rays. On the other hand, I have a note of a case of intense anginal attacks reported by C. Lundsgaard (12) in which the rays revealed a commencing aneurysm of the aorta, although physical signs were altogether negative. The pulse was 73, regular; arterial pressure was normal.

MORBID HISTOLOGY.

In these paragraphs on pathology we have to complain of the scantiness of the morbid histology in the records. Cases are reported as presenting no disease of the aorta in which no proper search had been made. The vessel is glanced at, probably on its inner surface only, no microscopic sections are made, and there inquiry ends! What should we think of a morbid anatomist who, in a case of alleged disease of the heart, was content to say that to the naked eye the organ seemed all right! If my impeachment of the aorta in angina is to stand, its opponents must employ stricter methods of investigation and report. From the base of the vessel to the arch at least the usual series of sections must be made, and, not in syphilis only, must the outer aspect be regarded as well as the inner. Klotz (13) has explained to us that the vessel is more prone to invasion at this part because the lymphatic channels are more abundant at the base and up to the arch, more abundant than in the heart, the flow of whose lymphatics indeed is chiefly outward. These facts have been made out best for syphilis; probably some other infections—the rheumatic and the influenzal, for instance—may attack first the inner coat and penetrate to the outer; it would then occasion no pain until it stretched the adventitia wherein lie the sensory end organs. The inner surface is probably insensitive. Even a healthy artery becomes painful when it is suddenly distended, as by an embolism, and its investment put on the stretch. Vaquez (*loc. cit*) illustrates these events by x rays of the anginous aorta, which is dilated and less transparent, or marked by dark patches. He concludes that the "anginal pain depends essentially on a periaortitis and not on coronary disease."

ABDOMINAL ANGINA.

I am not at all sure that an abdominal angina depending directly on lesion of the abdominal aorta is a definite clinical series, or that the epigastric variety of angina—certainly a definite series—depends on the seat of the aortic disease being below the diaphragm; but Dr. Stolkind (14) has described nine cases (out of 132) of syphilitic disease in which it is true that the abdominal aorta did not escape. But no indicative clinical symptoms could be ascertained; girdle and like pains, if any, could hardly be distinguished from those of tabes. Kneejerk might be absent in either case. As to syphilis, I may add that the Wassermann may be positive in persons over seventy years of age, and due to an infection, it may be, thirty or forty years before. Dr. Goodman, of Philadelphia (15), published an interesting case of abdominal angina but without autopsy. I may add that Stolkind in eighteen cases of angina found the myocardium normal—an important testimony.

On heart afferents, segmentary centres, and so on, I will say no more than I may have implied already; this subject has been dealt with, more fully than I can do, by Henry Head and other neurologists. I would only repeat that if by the heart is meant the myocardium, as most writers do mean, then I would reply that the naked heart itself, like other viscera—bladder, bowel, liver, spleen, pleura, aorta, etc.—has no afferents; these are not parenchymatous but capsular, and developmentally belong to the cutaneous sensory system (H. K. Anderson). When the investment of the viscera is put on the stretch, then, and not until then, does pain arise. To talk of "spasmophilic proclivities" and so forth is to talk in medieval logical terms, and to pay oneself with the paper currency of stock or abstract phrases.

OTHER HYPOTHESES OF ANGINA.

Of alternative hypotheses of angina I may refer to two or three. My old friend, Sir James Mackenzie, attributes it to enfeeblement of the heart. Every word of his is worthy of respect; but as he admits that with this explanation he is still puzzled I am content to say that it puzzles me, too. That of another old friend, Dr. Blackhall-Morison (16), puzzles me still more; Sir James is at least categorical; Dr. Morison seems to be hedging, and speaks of several "cardioaortic" and "aortocoronary" conditions, "no single state," etc., and dwells on neurotic hypersensibility of spinal segments, of which I will comment when I consider Mr. Verdon's opinions. The old ischemic theory is evidently falling out of favor; though Danielopolo still talks of "disequilibrium between heart work and coronary circulation" and "fatigue of the heart," although every clinical sign of an intact heart may abide during the paroxysm. The heart declines to "claudicate," another notion of which we shall hear no more. Danielopolo, by the way, rightly discards Vaquez's fanciful distinction between the angina of effort and the angina of rest.

Another old friend, Dr. Byrom Bramwell (17), although retreating from the old fastness of myocardial disease, attributes angina to stress on the nerve fitness and ganglia in the heart. But these are surely motor and motor only. The sensory nerve endings are in the investments, pericardial or periaortic. Several writers propose to explain angina by the stock phrase "intestinal toxins"—paper currency again, whether there be cash behind it or not.

Two more recent hypotheses there are that deserve fuller consideration as they are at least intelligible, that of Sir Charlton Briscoe and that of Mr. Verdon. In a recent discussion at the Royal Society of Medicine, Sir Charlton laid stress upon spasm of the muscular structures of the thorax as the source of the pain, especially of those of the upper group—the scalenes, the upper intercostals, and, above all, the triangularis sterni. Ossification of the cartilages aggravates the distress. On this point one may remark that angina is often quite as severe in young persons as in the elderly. But why should cramp of the triangularis sterni kill a person any more than cramp of the leg which is a much bigger area? The consultant sees far less of actual attacks than does the family physician; the patient arranges, indeed, to visit the consultant on "one of his better days." I rarely witness an attack, and am less able to criticize its transient phenomena, such as tender points, muscular spasm, etc. Still I feel able to say that, although the sufferer is held in dread of any movement, and, more than that, is sometimes held by thoracic cramp, yet this cramp is variable in degree and is often absent. And the tender spots, attributed to muscle, are surely the normal referred points of segmentary distribution and the relation to muscles incidental. Would not stress upon the sternum be referred to corresponding intercostal nerves only? And on this hypothesis ought not asthmatics also to suffer from anginal pains? Sir Charlton's hypothesis is ably set forth but will hardly commend assent. Even the orthodox have not been compelled to admit that aortitis alone can set up all the symptoms of angina; why then seek two systems of causes for the same series of events?

VERDON'S THEORIES.

Of this series of events one kind consists in certain gastric disorders; and on these Mr. Verdon has raised a hypothesis of angina which calls for a closer examination. Mr. Verdon's opinions on angina pectoris are ably, if somewhat desultorily, argued. The strength of his work is that it is by a physician in general practice who has been able to follow up individual cases from stage to stage during life. To morbid anatomy he hardly alludes; in private practice, of course, necropsy is rare. Briefly, but I hope not unfairly, I will sum up Mr. Verdon's argument as follows: Angina pectoris is a disease which consists in a disturbance of the nervous mechanism of certain spinal segments by peripheral irritation arising not in the heart but usually in the stomach. Whether as a tight ball, or as a sac distended by wind, in either case under tension, the muscular coat of the viscus is strained, and the strain, reflected to its corresponding spinal segments, and often beyond them, arouses responses which may range from dyspeptic discomfort to a stormy anginal radiation over wider and wider areas. Broadbent laid strong emphasis upon these gastric phenomena.

The mechanism of this reflection and radiation is of course common knowledge; Mr. Verdon's heresy is concerning their origin. If it be objected that while windy stomachs are common, angina pectoris is uncommon, the author replies that, in the anginous, with the gastric flatus coexists a peculiar instability of the corresponding spinal segment or segments—a morbid proclivity to which he gives the name of segmentary neurosis. According to the degrees of these factors we may meet with morbid reactions ranging from uncomfortable oppressions to more or less equivocal anginous pains or to violent outbreaks of classical angina. Free the stomach (or, exceptionally, some other tract of the intestinal way from esophagus to colon), prevent or dispel its windy content, and the angina will be prevented or dispelled. In illustration of the radiation of segmental pains Mr. Verdon describes, with care and abundance of instance, the appearance of tender spots and sensitive areas as described by many writers on the subject; these can be determined more completely by the family physician than by the consultant, as they are often transient and depend on the presence or proximity of an attack. The book abounds in interesting facts and records at first hand; for example, in a case in which salivation was a symptom he observed the saliva "spirting out of Wharton's duct."

Mr. Verdon's arguments in favor of this hypothesis, arguments set forth with vivacity and sincerity, are, briefly, those remarkable experiences of the anginous, admitted by all observers, of the alleviation or disappearance of the peculiar pain or flatulent eructation, experiences on which the author is justified in laying much stress; that, with the relief, bubbling sounds from the stomach may be heard with the stethoscope; that—and this is a remarkable observation—relief may be given at once even in the gravest and most menacing cases by passing an esophageal tube. Instances are given of rescue from apparently imminent death by this method, one which some of us might have been afraid, at so critical a moment, to put in practice. Mr. Verdon gives an ingenious illustration of this kind of relief in the vanishing of reflected pain instantly on the emptying of the womb in childbirth. Illustrations of perilous or mortal arrests of the heart by other abdominal pains are given; cases of death from uncomplicated biliary colic are quoted from Frerichs and myself, and the Arris and Gale lecture by Gray and Parsons (1912) is quoted to the effect that strong traction on stomach or esophagus may inhibit the heart even to the death of an animal.

WALKING CASES.

In this context, Mr. Verdon naturally lays stress on those cases which in my files I have been wont to classify as "walking cases." Of these cases I have notes of five or six, three in medical men. The patient will say that he cannot walk far without setting up an oppression of the chest—about midsternum—which arrests his pace or even stops him. Like the fully anginous, he makes excuse to admire the prospect, or to look into a shop window. He expels wind, is relieved, goes forward a little, is again oppressed, expels a little more, gets better, and so on until by a fuller eructation he may attain complete relief, and walk on in peace, perhaps for miles. Now these sufferers often find no difficulty in other modes of effort; they can attend to their business, go up and down stairs, even ride a bicycle, and so on; but no sooner do they begin to walk than the distresses begin anew. The trouble begins sooner if the walk follows a meal, especially a meal of carbohydrates, such as tea and cakes. These cases have been a puzzle to me, but I think Mr. Verdon's explanation may suffice. He finds that on walking the girth of the abdomen is reduced by some three inches; for the abdomen is a muscular sac bounded by diaphragm, perineal and abdominal muscles, all of which by walking are put on the stretch, so that the intraabdominal pressures are raised. In cycling, on the contrary, the rider, leaning forward on the handles, relaxes the abdominal muscles and lowers the inner abdominal pressures. This experience is true; I have heard it from more than one patient. Two medical men have told me that they could ride a bicycle with impunity, though often they could not walk a few hundred yards without oppression. Mr. Verdon agrees with me that spasm of the intercostal muscles, or again of the diaphragm, is not constant in the anginous attack, and as in family practice he has had many more occasions of observing attacks, mild and severe, his opinion is the better.

GASTRIC PHENOMENA IN ANGINA.

As in my work on angina pectoris I had laid stress on the gastric phenomena of the attacks in words often quoted by Mr. Verdon; I am not surprised to find their importance yet more strongly emphasized. And even if this emphasis is somewhat onesided, something of a special pleading, yet it is well that even by exaggeration the protest is made, for no doubt in this way much useful counsel arises for the management and treatment of the sufferer. To rest after food, to avoid any bulk of carbohydrates in the diet, and to drink only between meals, are crucial precautions. That the nitrates relieve tension of involuntary muscle anywhere in the body—stomach or artery—has been proved by Professor Starling, Dr. Dixon, and others; the drug is still effective whether in case of gastric or aortic tension. Mr. Verdon may fairly claim that where other pathological conditions of angina exist, there gastric conditions may take a very active, even if subordinate, part in the attacks; they have no doubt even more importance than have been given to them already. But for me they are not all, nor even primary among, the causes of angina pectoris. Mr. Verdon, as I have said, alludes to pathological conditions; nevertheless his negative criticisms are effectual, inasmuch as they take the heart out of the foreground of the picture; he agrees with me that coronary disease, though it is a frequent cause of death in an attack, is not a cause of angina. For example, more than once Mr. Verdon had the opportunity of taking jugular and radial graphs during an attack, when he found the several functions of the heart normal in all respects; indeed, he found in these circumstances that extrasystoles, present before an attack, ceased during it. I have to thank Mr. Verdon for many kindly references to my book.

But the demur I must make to Mr. Verdon's hypothesis is, not that he is altogether wrong, but that he takes a part for the whole. He loses sight of morbid anatomy, though he admits (p. 228) that "organic disease may be the basis of angina." If we group these cases of gastric oppression we shall find that none of them, or almost none, falls on the hither side of middle life; although dyspepsia is by no means confined to this age period. The consequential symptoms which he describes are then part of a malady of elderly persons, of a time of deteriorating and stiffening bloodvessels; moreover, many victims of angina are without gastric symptoms, as I have repeatedly ascertained, even by leading questions. It would seem that to produce the anginal symptoms the gastric disorder must disturb in some way a cardioarterial system already deteriorated and reduced in potential; a little earlier in life, it might be, by syphilis, later by arteriosclerosis. Many old persons—perhaps all?—find that they must give up hastening on foot to the trains and the like, because to run only a few steps produces a substernal oppression. This arrest is probably due to loss of resiliency in the great vessels; they are less quickly adaptable to stresses. And, on a less cardinal point, I think Mr. Verdon dwells too much on the part of involuntary muscle of hollow viscera in generation of pain. In my book, and in this article, I have accepted Dr. H. K. Anderson's teaching that, on the whole, sensory nerve and organs lie not in muscle but in the connective tissue, developmentally subcutaneous, which invests the muscle. A few, it is true, may be carried up on connective tissue by tendon, or otherwise, into the muscle proper; but the pain is generated not in the muscle itself but in its investments and attachments. Again, we are too much possessed by the analogy of cramp in a voluntary muscle of a limb; for whether, in a hollow viscus, its muscle be contracted or relaxed seems to me to be in this respect a matter of indifference, a matter of attitude only, not of strain; if so, such pain as there may be must arise not in the muscular fibres, but in a pull on their attachments. A shortening of the fibre, say in the bowel, is probably unperceived until the retraction begins to pull upon the mesentery. Although it is true that these revised physiological doctrines hardly invalidate Mr. Verdon's main conclusions yet they cannot be ignored.

SEGMENTARY NEUROSES.

Furthermore, I find myself unable to follow Mr. Verdon in his predication of a "segmentary neurosis"; indeed I do not precisely know what he means. Passing over the vague term "neurosis"—always better avoided—I gather that the segment concerned is supposed to be in a state of excessive irritability—too quick of response. Such an excess is difficult to comprehend. Surely a segment cannot be too ready in response. A dog is sleeping on the hearth; a sharp knock comes and he is standing on all four feet and barking before the eye can follow the movements. A free reflex must be as instant as "nerve force" can travel; swiftness or irritability is its business. Excessive, or rather untimely and ungoverned response, as in the start of a slight surprise, signifies not that the corresponding segment or segments are too excitable, but that their governance—their inhibitory restraint—is relaxed; its guardian centres are fatigued, or in some other way reduced. This explantation, which Hughlings Jackson used smilingly to call "Allbutt's let-go theory," has always recommended itself to me, and now I think is generally accepted. The higher the plane of nervous structure the more fatigable it is. We may note an illuminating instance of this process in the gradual increase of eyestrain until its extravagances become intolerable. Rest, natural and artificial, is, as I shall advise, the only means of cure.

On many points of more immediate importance I am glad to have Mr. Verdon's support. For him, as for me, the coronary and myocardial hypotheses of angina are dead and buried; though as conditions of death in an attack they are frequent, and possibly essential. I must repeat that comparatively young patients, in whom the myocardium is healthy, in syphilitic aortic disease for example, often, perhaps generally, recover; whereas, in elderly persons or those in whom the myocardium has suffered, recovery, though not unknown by any means, is infrequent. I once visited a vigorous old gentleman of eighty-two who had suffered for a few weeks from obvious angina pectoris; it lasted in all about three years, and then passed off entirely, leaving him some peaceful years before death in extreme old age. The morbid focus may heal.

Of the indifference of the pulse, even as measured by the jugular and radial graphs, I have already spoken. We agree also that in angina blood pressures are variable and inconstant, and, unless driven up or down by agony, depend on other factors. On this point Pavloff's experiments on the fluctuations, blood pressure under degrees of distention of the stomach before and after sections of vagus, are interesting and important. I have described a case in which the arm (left), even between the attacks, remained tender and swollen; and had to be nursed on a cushion. Mr. Verdon described a similar instance; and I likewise have found it impossible in some cases to put on an arm cuff for the tenderness of the limb. In a case of angina, in which the pain, or some of it, was really "precordial," Mr. Verdon found the left rectus abdominis muscle at its insertion gathered into a cramp.

TREATMENT.

On treatment of angina there is not much that is new. I proposed in my first paper rest as a main part of the treatment, for the same reasons as in aneurysm of the aorta. In severe cases this means likewise many weeks in bed. It is not always possible for the patient to surrender himself to such a discipline, but where I have been able to give the method fair trial it has answered expectations. In one case of exceptional severity the patient made arrangements for a long confinement, and was in bed for five months. Gradually the attacks, intense and almost incessant at first, grew milder and less frequent, and the patient is now at large, making even short journeys from home without ill effects. Colleagues of mine tell me that they also have found good effects from this method. The seclusion from calls of business or society, the suppression of the doorbell, and the equal temperature give rest to the parts affected, and to the upper nervous controls. The diet is of course adjusted to the state of rest and of the stomach.

Although the nitrites often relieve the false anginas, and do not always relieve the true, still they are an invaluable aid. They must be fresh, they soon fade. As Osler and others have said, the doses may be increased far above those in general use. It is true that patients become somewhat inured to them, but, as Dr. Ingals says, they are harmless, and we do not hear of any morbid craving for the drug. In my prescription of atropine, as a prophylactic against fatal inhibition, I find I have the same recommendation to make; namely, that the dose may need considerable increase—to one fiftieth or even one thirtieth of a grain. Digitalis may be useful; it is hard to say when and how. Perhaps acceleration of the pulse may be a guide. In angina it is a double edged weapon, and often does harm; unfortunately we have no criterion for use or refusal. It is not true, however, to object that digitalis would raise arterial pressure by peripheral constriction, for in medicinal doses it has not this effect. Diuretin, theobromine, sodium salicylate, harmless at worst, come in usefully when we have reason to think that the circulation, as indicated by scanty urine and the like, requires some reinforcement. On arsenic and iodide of potassium I have nothing more to say than is generally known; both these drugs are of some service. On diet in the treatment of angina I have spoken more than once in the course of this article, but its importance in the cure or relief cannot be too strongly reiterated.

In conclusion, I must allude to Jonnesco's operation for the relief of angina, and so for the saving of life, by the division of the left sympathetic in the neck. He reports two cases of success (18). Time and larger experience are necessary before any opinion on this method can be pronounced. But I may point out that Jonnesco assumes the origin of the pain to be in the chronically inflamed investment of the aorta, and proceeds therefore to cut the path of transmission to the cord and encephalon.

REFERENCES.

1. Powell, Sir Douglas: *Lancet*, May 1, 1915.

2. Brown, George: *Annals of Medicine*, vol. i, No. 2, July, 1920.

3. Klotz: *Journal of Pathology and Bacteriology*, vol. xviii, 1913; *Transactions of Association of American Physicians*, 1912.

4. Cohnhem and Rechberg: *Virchow's Archives*, 1881, Bd. 85, p. 503.

5. Steell, Graham: *Medical Chronicle*, November, 1913.

6. Obrastzow and Strachesko: *Zeitschrift für klinische Medizin*, Band 71.

7. Herrick: *Journal A. M. A.*, vol. cix, December 7, 1912.

8. Hochhaus: *Deutsche medizinische Wochenschrift*, November, 1911.

9. Head, Henry: *Brain*, vol. xxviii, 1900.

10. Kidd, Leonard: *Review of Neurology and Psychiatry*, November, 1911.

11. McCrae, Thomas: *American Journal of the Medical Sciences*, October, 1910.

12. Hürthle: *Deutsche medizinische Wochenschrift* September 22, 1901.

13. Lundsgaard: *Lancet*, January 15, 1916.

14. Klotz: *Transactions of Association of American Physicians*, 1917.

15. Stolkins: *Medical Press and Circular*, July 6, August 10, August 31, 1921.

16. Goodman, Edward H.: *Medical Press and Circular*, July 3, 1918.

17. Morison, Blackhall: *National Medical Journal* vol. i, No. 9, July, 1915.

18. Bramwell, Byrom: *Clinical Studies*, No. 7, 1915

The Significance of Peripheral Resistance in Circulatory Disturbances

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The significance of the term peripheral resistance, when circulatory phenomena are under practical consideration, requires more critical examination than is commonly given to it. The teaching on the subject is almost entirely confined to obstructive resistance in arterioles and in the capillaries to which they lead. This concept has dominated medical thinking so long and so strongly that there is difficulty in obtaining acceptance of a wider application of the term. The big fact has not yet been fully realized that all arteries possessing a muscular coat have their lumen constantly changing in virtue of that possession; that the muscular coat is there for that purpose, and not merely to act as a superior or specialized elastic structure responding mechanically to the character of the traveling pulse wave. When this simple proposition is applied to the study of the pulse the question to the clinician then is, what are the determining causes of the arterial movement? In answer to that question it may be stated broadly that the factors which influence and determine this play of the muscular coat are two in number, namely, a, nervous, b, blood composition. The nervous influences are, on the one hand, reflex, affecting the distribution of blood to different regions; and on the other hand to brain influences of emotion and of fatigue. The influences of blood composition operate mainly, I think, directly on the arterial wall. Blood composition is a highly intricate problem, and must present extremely subtle variations judging from the viewpoint of our experience as to the food and drug idiosyncrasies of individuals.

The reactions of involuntary muscle to the products of the endocrine glands added to the blood, as these are known pharmacologically and therapeutically afford further striking proof of the minuteness of chemical variations in blood content capable of producing contraction of the involuntary muscle of the arterial wall. The play of tonus, as I have ventured to call this contraction and relaxation of the muscular coat of the arterial wall, carries a much greater significance than the idea of peripheral resistance as confined to arterioles and arterial capillaries. It means that the muscular coat of such arteries as the radial and the brachial contracts and relaxes, under the influence of the factors stated above; and that when it contracts the lumen of the tube is lessened, and when it relaxes the lumen is enlarged. Such variations undoubtedly occur and can be followed by the finger. On the other hand no such variations can occur in the aorta and the vessels which have an elastic in contradistinction to a muscular coat. If this big fact is accepted it leads to further important readjustments of current views. The first of these is that when the systemic arteries of the size of the radial and the brachial, which are the arteries of clinical observation, contract their lumen is lessened in proportion to the measure of contraction, and that such contraction necessarily increases resistance to the onward blood flow. Inside the contracted artery blood pressure falls, while in the noncontractile aorta and its branches the pressure is raised. This raising of aortic blood pressure is thus due to and the result of peripheral resistance in the largest arteries possessing a definite muscular coat. The increased resistance to the blood flow has thus to be placed much further back than is usually meant by the word periphery.

The raising in this way of the blood pressure in the aorta necessarily requires a larger expenditure of ventricular power to open the aortic cusps, and to empty completely the blood of the ventricle into the aorta. This may even necessitate some dilatation of the ventricle, a process which has been shown by Starling to bring out the reserve of myocardial power. However that may be, there is no doubt that the reserve of power of the perfectly sound myocardium is amply sufficient to meet the calls of recurrent raising of aortic pressure from such arterial contraction. If heightened aortic pressure be maintained as the result of continued arterial hypercontraction there is equally no doubt that the normal myocardium hypertrophies; and that a gradual heightening of aortic blood pressure, with a gradual advancing myocardial hypertrophy, occurs and may go far before it is brought under the physician's notice. These movements of contraction and of relaxation, say of the brachial artery, from tonus to hypertonus or to hypotonus, is roughly measured instrumentally by means of the sphygmomanometer. And it is this record that is of inestimable value to the clinician who interprets its findings from the viewpoint of the arterial wall and of the factors which actively and continuously influence and determine hyper or hypotonus. Hypertonus always means a smaller lumen, a thickened wall, a fall of blood pressure inside the overcontracted vessel, and a rise of aortic pressure. This is the physiological sequence of events, and is in accordance with the physical findings on the flow of fluids in tubes.

In the foregoing short summary of what I hold to be the true point of view from which circulatory phenomena have to be regarded, is accepted, it follows that the significance of peripheral resistance has a new meaning given to it as an early phenomenon in what leads to arteriosclerosis, as well as in all states in which the myocardium of the left ventricle has no longer the large reserve of power it is accepted as physiologically possessing.

The significance of this larger application of the term peripheral resistance can be illustrated from various sides, and some aspects of it can be illustrated by cases recently under observation. Before, however, dealing with more recent cases, I shall briefly refer to cases of organic disease at the valve orifices on the left side of the heart which I have dealt with more fully elsewhere. It is not necessary at present to do more than postulate that a socalled valve lesion draws upon the physiological reserve of the myocardium to compensate for the defect. The amount of reserve called out varies with the gravity of the effect of the lesion. In many cases there is a steady drawing upon the reserve. This occurs in cases of physical strain with the aortic blood pressure repeatedly raised. But this raising of aortic pressure is also brought about by contraction of the systemic arteries from the causes which have been indicated above, and this can promptly embarrass a damaged heart which is already working to the top of its power; or the arterial contraction may supervene on an already damaged heart recently enfeebled by temporary indisposition. In either case there are the ordinary signs of an embarrassed myocardium, and the embarrassment may be removed by judicially relieving the arterial contraction.

A valvular lesion is not, however, necessary for the manifestations of myocardial embarrassment from overcontraction of systemic arteries. The best examples of this class are met with in cases of arteriosclerosis (distinct from atheroma) with or without albumin in the urine. Arteriosclerosis has often advanced far before the physician's aid is sought. Headache, precordial pain, a greater measure of breathlessness on moderate exertion, or attacks of breathlessness or perhaps palpitation during the night may be the symptom which has sent the patient to the physician. On examination the radial artery may be only moderately thickened, and the wave in it may be fairly good and quite regular; the apex of the heart is beyond the vertical mammary line, the sounds are well heard and pure, but the aortic second sound is accentuated; the urine is of good specific gravity and does not contain sugar nor albumin; the sphygmomanometer applied to the upper arm gives a pulse pressure in the brachial artery of say somewhat over or under 200 mm. The finger often reveals a brachial artery smaller and harder relatively than the radial. This is a common picture but the interpretation of the phenomena is not commonly correct. The foundation of true interpretation lies in recognizing that there is some measure of permanent arterial thickening (which is not atheroma); and that in addition the artery is overcontracted, and is being kept thus by some one or other of the influences to which large arteries with a muscular coat respond. When this is determined it inevitably follows that the overcontracted sclerosed vessel presents increased resistance to the blood flow and that the heart, which may have been equal to the measure of increased resistance up to the time when a wave of still further constriction supervenes, is forthwith embarrassed, and symptoms emerge which may be alarming. These are the arterial phenomena which lead to attacks of angina pectoris without heart lesion, or to attacks of what is unfortunately called cardiac asthma or uremic asthma.

Recently I saw a lady who was believed to be suffering from asthma, made worse by foggy weather; and was having attacks during the night of precordial pain, with heart embarrassment and dyspnea, keeping her from sleep and necessitating sitting up in bed. The night attacks had been regarded by her friends as nervous and it was even suggested to me that she might be benefited by autosuggestion treatment. There was no albumin in the urine. The heart was enlarged, and the brachial pulse pressure was over 200 mm. when sitting up in bed and free from symptoms. The lungs were perfectly clear and sound. I did not have an opportunity of seeing the patient during a night attack, but I had no doubt that in those attacks the brachial pulse pressure would rise many millimetres from a wave of further constriction leading to heart embarrassment in the way already described. The night attacks were speedily checked when their true nature was understood.

Another patient I saw in the country recently, whom I had seen in June, when his pulse pressure was 120 mm. mercury. He was in bed suffering from irregular heart action, and insomnia accentuated by air hunger. The brachial pressure was 160 mm. There was no albumin in the urine. The history was that he was probably taking too much alcohol and that he could not sleep without it. He was given squill and spirit of nitrous ether, with bicarbonate of soda between the doses, and twenty drops of paraldehyde at night, to be repeated if necessary, and no whiskey. I saw him on the following day: he had slept well, the air hunger had disappeared, the pulse was regular, he had lost the slight tremulousness he had shown on the previous day, the brachial pressure had fallen to 135 mm., and he was anxious to resume his daily duties. In this patient I had no doubt that the air hunger was a manifestation of acidosis, probably alcoholic, causing arterial constriction which embarrassed the heart.

Another very striking case was a patient who had been under observation in a nursing home for a few weeks. He had at various times during recent years been under my care, but at long intervals. He had a high brachial pressure, with moderately thickened vessels, subject to attacks of overconstriction producing symptoms which sent him into my hands again. The overconstriction was overcome; and so long as he followed instructions he kept well with a pressure between 160 and 180 mm. He was a very active, vigorous man, only sixty years of age, who threw off medical restraint as soon as he was relieved; but after each return to his mode of feeding and to the worry of business his condition was more intractable. This last time he returned he was suffering from want of sleep due to an enlarged and irritable prostate requiring him to micturate every half hour or so. He was passing from fifty to seventy ounces of urine in the twenty-four hours, which contained five grains or more of urea to the ounce. The pulse was of moderate volume and regular, and the brachial pressure was 220 mm. The prostatic condition became worse and complete retention ensued. Catheterization had to be resorted to, and the secretion of urine was so free and rapid that the catheter had to be left in the bladder. This was continued for some time without sufficient improvement in the state of the prostate to enable the bladder to empty itself. The prostate was accordingly removed by one of my surgical colleagues. The operation presented no special difficulty and the anesthetic was taken well. By the following morning no urine had been secreted, there was evidently complete suppression; the general condition was extremely grave; the radial artery was a mere firm thread, with a wave so small and irregular in force that it was difficult sometimes to feel it, and beating somewhere about 140 a minute. There was definite lividity, he was apathetic and evidently slipping into a uremic coma; the sphygmomanometer applied to the upper arm required a pressure of 220 mm. to obliterate the bigger pulse beats in the radial artery. Those who have seen cases of this kind, especially in patients with arteriosclerosis, know how gloomy the immediate future is and it need not be enlarged upon here. After anxious consideration, and with the consent of my surgical colleague, to whom I explained my views, the patient was given pituitrin and erythrol tetranitrate. The result was that the kidneys resumed their function, the pulse became larger, slower and regular, the lividity disappeared, the deepening apathy was speedily changed, the arteries had, of course, relaxed and the brachial pressure had fallen to 160 mm. A free secretion of urine continued and the pulse pressure was kept between 160 and 180 mm.

These recent cases are given in brief outline to emphasize the importance of my contentions with regard to hypertonus, and to the recurring waves of still greater constriction which occur in the large arteries. These great movements of the arterial wall give a very different significance to the term peripheral resistance than what is commonly given to it. Until the facts I have dealt with are given their proper place in medical thinking there can be no intelligible explanation of attacks of angina pectoris whether due to organic or to functional causes; or of the variety of symptom met with in cases of arteriosclerosis, either with or without albumin, including those commonly called uremic or cardiac asthma, or merely uremia.

REFERENCES.

1. Russell, W.: *Arterial Sclerosis, Hypertonus, and Blood Pressure, and The Sphygmomanometer: Its Value in Practical Medicine.* London: Bailliere, Tindall & Cox.

2. Starling: The Linacre Lecture on *The Law of the Heart,* 1915.

The Relation of the Peripheral Circulation to Diseases of the Heart

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The heart is a selfregulating and selfrepairing force pump, which has great reserve energy to meet any emergencies, and wonderful power of adaptation to regulate its work according to the needs of the system and the varying strains to which it is from time to time subjected. The function of the circulation is to supply all the parts of the body with nutritive material and oxygen, and remove waste products therefrom, and the more perfectly this function is performed the better for the health and longevity of the individual. The work of the heart is regulated at the periphery, hence a knowledge of the circulation to be of any therapeutic value must include every part of the circuit, the narrow specialism which sets diseases of the heart as a special subject of study apart from the general circulation can only lead to disaster.

Chronic diseases of the heart arise from causes acting on the periphery; this is a rule to which there is, perhaps, no exception. Even the presence of a syphilitic gumma in the heart starts in a capillary. In acute cardiac disease such as pericarditis, endocarditis and myocarditis the capillaries and arterioles are first involved. The only exceptions are poisons such as muscarine, and the rare earths and toxins of many diseases such as diphtheria, pneumonia and typhoid fever which act directly on the myocardial fibre. Every muscle cell is a miniature battery, and any agent which discharges these numerous little batteries completely paralyzes the muscular tissue.

In my Toronto address on The Circulation Viewed from the Periphery (1) I dealt very fully with the physics of every section of the circulation, and since then I have seen no reason to alter or modify any of the views therein expressed. I shall therefore consider it unnecessary to enter minutely into the physics of the capillaries and arterioles except so far as their general bearing is concerned on the work of the heart.

It is quite true that Prof. Leonard Hill has materially altered views which he at one time held on the capillary circulation. Recently he and Dr. McQueen have spent much time and energy in determining the lateral pressure in the capillaries. Their main object would appear to be to show that the lateral pressure is too slight to exercise any filtration sufficient to overcome the osmotic pressure of the colloids. They would therefore appear to be anxious, like Heidenhain before them, to raise the endothelium of the capillaries to the high level of a secreting structure. If they had devoted as much attention to the energy of the blood their views would, perhaps, have diverged less from those of other observers. The energy of the blood in every section of the vessels is a compound of velocity and lateral pressure, of kinetic and potential energy, which stand in an inverse ratio to one another; the greater the amount of energy expended in producing velocity the less remains as potential in lateral pressure. They have experimentally shown that under ordinary circumstances the lateral pressure in the cerebral capillaries is very slight and little, if it all, above that of the cerebrospinal fluid and the cerebral veins. I do not know of any one who ever seriously contended to the contrary, except, perhaps, Leonard Hill himself, who at one time held that under certain circumstances the pressure in the cerebral capillaries might rise to 100 mm. of mercury. In this connection it may be worth while quoting the following paragraphs from my Toronto address, more especially so as they have a direct bearing on the subject of apoplexy. "The cerebral arteries and arterioles have relatively thin walls in proportion to their calibre. The inner coat is well developed; in the middle coat there is a moderate amount of muscular fibre, but the elastic tissue is defective; the external coat is attenuated, and ceases before the muscular coat disappears and the arterioles pass into the capillaries. The external coat is composed of connective and white fibrous tissue with longitudinal striation, and there are no elastic fibres. Robin described a lymphatic sheath over the arterioles, which strengthens them and helps to supply the place of the defective adventitia.

"These vessels are not very contractile, and take no part in regulating the general arterial pressure. Owing to the stress and strain to which they are frequently submitted they are very liable to atheromatous and calcareous degeneration of the internal coat, and thickening or periarteritis of the external coat; there are also frequently small miliary aneurysms. Physiologists, as a rule, do not admit that these vessels possess any vasomotor nerve fibres, but Dr. Alexander Morison says that he discovered their presence; if so they must be very scanty, and perhaps only serve trophic function. There is not a very great amount of muscular fibre on which they can act, and adrenalin does not cause any contraction of these vessels, of the coronary, or pulmonary arteries as has been shown by Schäfer, Dixon, Brodie, and Elliott. The capillaries are small, short, well-supported vessels, which seem to be able to bear a considerable amount of strain, as Leonard Hill has shown that sometimes the pressure may be at zero and at other times when the head is down it may rise to 100 mm. of mercury. This latter condition must however be rather exceptional, as the carotid arteries have great contractile power. Professor MacWilliam has shown that postmortem the carotid can be easily made to contract to half its former diameter, and any one can easily satisfy himself as to the great variations which occur in life. Under these circumstances the circulation in the brain becomes largely kinetic, the velocity is enormously increased, but not the lateral pressure. The cerebrospinal fluid is very deficient in proteid, from which we may infer that under ordinary circumstances the capillary velocity is relatively great and pressure slight. In cases of meningitis the proteid in the cerebrospinal fluid is increased."

The energy in the cerebral capillaries like that in every section of the circulation is a compound of lateral pressure and velocity which stand in an inverse ratio to one another. In the cerebral arterioles and capillaries the lateral pressure is slight and the velocity great, hence the free supply of oxygen to the brain.

There is an enormous difference between the circulation in the brain and that in the liver. In the latter the capillaries are short and wide, measuring 0.5 to one mm. in length and ten to thirteen micromillimetres in diameter. The velocity is often so slow that the liver is of a dull purple color, and the pressure is relatively but not absolutely high. The liver capillaries are very permeable, and, as has been shown by Professor Starling, give rise to a free secretion of concentrated lymph. This is in accordance with the observations of Runeberg and of myself that the concentration of the filtrate is greater at lower than at higher pressures. Professor Starling has also shown that the lymph is also increased by any obstruction to the outflow from the hepatic veins. In the large nutmeg livers, induced by positive intrathoracic pressure and regurgitation through the tricuspid orifice, the capillary pressure is increased and the velocity diminished. In the early stages of hepatic cirrhosis, while there is an increased exudation and fibrosis along the portal vessels there is also marked congestion of the central lobules due to cardiac asthenia, dilatation of the tricuspid orifice, and increased venous pressure, the results of chronic alcoholic intoxication. At this period the liver is enlarged from hepatic congestion, and it is only later that the contraction of the newly formed fibrous tissue leads to diminution in bulk. The liver acts as a reservoir for the right side of the heart.

In dealing with the physics of the circulation we are often apt to overlook the fact that the heart is composed of two physiologically distinct organs—the right and left heart. Each has its own varying amount of work to perform and, under normal conditions, it performs it without any assistance from the other, but in cases of stress or difficulty they mutually assist one another. They act together and are set to the same tune, but this does not prevent one side from beginning or ending contraction before the other, and so much so is this the case—and they are at least to this extent independent—that doubling of both sounds of the heart is one of the most common of cardiac phenomena. In a healthy heart, both sounds are usually doubled every deep respiration. In speaking of the work of the heart we usually refer to that of the left ventricle and add about a third for that of the right side.

The following formula can be used for calculating the energy of the blood in any section of the circulation: $\frac{MV^2}{2} = \frac{1}{2}\frac{W}{G}2Gh$. Starling's formula is very convenient for calculating the work (W) of the left ventricle: $W = wR \times \frac{wV^2}{2Gh}$. Here w represents the weight of the blood thrown out at each ventricular systole, and R. the resistance. The amount of work largely depends on the resistance which is a very varying quantity. As the resistance in the systemic circulation is usually more than three times that in the pulmonic circuit the left ventricle is at least three times more powerful than the right. The first line of resistance occurs at the arterioles which are well supplied with vasomotor nerves of the constrictor type. The nerve supply to the pulmonic circulation is scanty, hence the resistance in healthy lungs is never great, and the only extra strain thrown on the normal right ventricle is the demand of the system for increased oxidation. This is usually of a temporary character which is easily met by the reserve energy of the right ventricle, hence hypertrophy of the right ventricle is not so common as that of the left. In 1876 Lichtheim in Connheim's laboratory showed that when he tied more than half the pulmonic arteries the normal quantity of blood arrived in the left ventricle, and the pressure in the open pulmonary branch only rose from 180 to 260 mm. of the soda manometer.

A similar condition often arises in pneumonia, but here the difficulty is not so much in getting the blood from the right to the left side of the heart as in the deficiency of oxygenation. In each case I recommend deep breathing which is assisted by propping the patient up, and hanging over his head a cross bar of which he can lay hold with both hands. The capillary bed in the lungs is not so great as that in the systemic system and therefore might be supposed to offer greater resistance, but it is not liable to the same great variations in capacity, is very open and offers very little resistance to the onward passage of the blood. As indirect evidence of the effect of strain in the production of arterial degeneration we have the rarity of its presence in the pulmonic circuit except in cases of mitral stenosis, and then the pulmonary veins are as much affected as the arteries.

In the systemic system the chief line of resistance is in the arterioles of the splanchnic area, and of the skin. These two sets are often reciprocal in their action—when one set is contracted the other is dilated, hence the resistance is maintained at a more or less uniform rate. The arterioles of the muscles dilate after exercise.

WORK OF THE LEFT VENTRICLE.

In estimating the work of the left ventricle Starling sets down the weight of the blood expelled at each contraction as fifty grams, the resistance at 150 mm. of mercury, and the velocity at the root of the aorta as 500 mm. in the second. I think fifty grams too low for the discharge of a normal left ventricle though I would be quite willing to accept two fluid ounces. The velocity of 500 mm. in the second is a nice quiet circulation which would suit a Methuselah, but the resistance of 150 mm. of mercury is much too high and quite inconsistent with the other two factors.

Professor Haldane has calculated that one and eight tenths gallons of blood pass through his heart in one minute, and I suppose through the heart of anyone else of similar dimensions; this might answer very well for a bullock whose tenure of life is not very great at the best, but any human pump working at this rate would inevitably reduce the period of existence of the possessor to that of the bullock. There must be no excessive stress in the circulatory apparatus which is to carry an individual well on to a century.

The size of the arterioles is regulated by the vasomotor nerves which are controlled by a well regulated balance of the adrenalin and pituitary secretions. Numerous drugs and toxins have very varying effects on arteriolar resistance. The resistance in the arterioles is directly as their length, and inversely as the square of the cross sections, or the fourth power of the diameter, and directly as the square of the velocity. It is impossible to estimate the ever varying capacity and sectional area of the arterioles and the velocity of blood passing through them. What we do know is that on an average a similar quantity of blood passes through a section of the arterioles to that which passes through a section of the aorta in a unit of time. The total sectional area of the arterioles is considerably less than that of the small arteries, and the velocity of blood in them correspondingly greater. When the arterioles are contracted we know that the energy of blood in them is largely converted into velocity with a corresponding diminution in the lateral pressure.

If you take a cold hand there may be a difference of 50 mm. of mercury between the lateral pressure in the radial and that in a digital artery, but if the arterioles be dilated there is a much less abrupt fall in the pressure gradient. As a rule the more contracted the arterioles the higher the lateral pressure in the arteries, and this high potential in the arteries drives the blood with great velocity through the arterioles, and, of course, the greater the velocity the less the lateral pressure. A small area of arterioles such as that of the hand may be contracted without any effect on the general arterial pressure, and in this case the velocity of blood in the constricted arterioles is not increased but diminished, owing to the increased friction and heightened viscosity of the blood. It is entirely due to the intervention of the arterioles that the capillaries are protected from the full hydrostatic effect of the blood when the body is in the erect posture.

The potential increases in the arteries of the limbs when they are dependent, and if the arterioles are dilated from any cause the pressure in these little vessels, and in the capillaries is much augmented, so that you may readily get petechial hemorrhages, but, on the other hand, if the arterioles are much contracted the potential in the arteries is largely converted into kinetic energy in the arterioles and capillaries.

When the vasomotor nerves are paralyzed or the arterioles relaxed from any cause, there is a gradual fall in the pressure gradient and the resistance is transferred to the capillaries which thus constitute the second line of resistance. The larger the capillary bed the less the resistance, but as rarely more than a fourth of the capillaries are full at one time, and the capillaries of the splanchnic area are capable of holding all the blood in the body; it is impossible to estimate the sectional area and capacity of the capillaries. There is a considerable expenditure of energy in the capillaries both in the form of pressure and velocity. When a given quantity of fluid is driven through a set of tubes the velocity will depend on the force of propulsion minus the obstruction to the outflow with the inertia or viscosity of the liquid and the friction of the tubes; and the lateral pressure stands in direct relation to the freedom of the inflow and the obstruction to the outflow. The capillary velocity varies enormously; my measurements ranged from four tenths mm. per second when the patient is dying to twenty mm. per second in the great toe when the patient is standing and there is very high arterial potential.

VISCOSITY OF THE BLOOD.

The viscosity of the blood is five or six times that of distilled water, and is no doubt the chief cause of the resistance in the capillaries. It is increased by the number of corpuscles, by cold, by the salts of calcium, magnesium, manganese, and strontium, by carbonic acid and when the velocity falls to one mm. a second the blood becomes surcharged with carbon dioxide. It is lessened by heat, citric acid, phosphoric acid, the salts of ammonium, potassium, and sodium, by thyroid and iodine.

CIRCULATION IN THE VEINS.

The energy of the blood is not all spent in the capillaries but a fair amount is carried on to the venules, which are smooth capacious vessels and offer little or no resistance to the onward flow of the blood. They are slightly elastic and attain their maximum distention at a low pressure, they are contracted by cold and mechanical irritation, and dilated by heat. There is a gradual fall in the pressure gradient from the venule to the right auricle. Although the circulation of the blood has been known for considerably over three hundred years it was left to me to discover that the venous blood runs more quickly up the hill than it does down it, and this is due to the increased energy in the arteries and capillaries in a dependent limb.

THE CORONARY CIRCULATION.

The coronary arteries and arterioles which supply the heart closely resemble the cerebral vessels in being thin walled, rather deficient in muscular fibre and having very few vasomotor nerves; they are said to contract under the influence of pituitrin but not with adrenalin. The arteries are terminal and, as a rule, those portions which are imbedded in the muscles remain fairly healthy, but the parts which are not subject to muscular compression and which consequently are constantly under the strain of the aortic pressure are very liable to atheromatous and calcareous degeneration.

RESISTANCE TO OUTFLOW FROM ARTERIES.

The resistance in the arterioles and capillaries calls forth the necessary energy of the heart and thus the arterial pressure is maintained, and with any increase in the resistance the reserve force of the heart is at once called forth, and when the increased resistance is long maintained the heart hypertrophies in order to meet the demand for extra work. The high pressure in the aorta must under all circumstances be maintained by the heart, and when there is cardiac failure the pressure must fall no matter what be the resistance. We know that the peripheral resistance must be always less than the arterial diastolic pressure otherwise the blood would come to a standstill in all the large arteries during the second half of the ventricular diastole. The most perfect circulation is one with a moderately low systolic and a relatively high diastolic pressure—a gentle slope in the pressure gradient from the root of the aorta to the small arteries and arterioles. A moderate strain does not impair the elasticity of the aorta and its main branches, and the nutrition of the heart can be maintained to a very old age.

With a very high diastolic pressure—say of 150 or 200 mm. of mercury in the aorta and its main branches—there is no period of repose for the vessels, but merely periods of greater or less distention; there is interference with the circulation in the nutritive vessels, the vasa vasorum; irritative and proliferative changes occur in the subendothelial layer of the intima, atheromatous, and, perhaps, calcareous degeneration follow, and the elasticity of the arteries becomes impaired. The first portions of the coronary arteries are subjected to high diastolic strain, and consequently early undergo degenerative changes. In proportion to the loss of elasticity in the aorta the energy of the heart is not stored up, and with this loss in the conservation of energy the heart has more work to do in order to carry on the circulation. The diastolic pressure and the quantity of blood in the heart are increased, there is a greater amount thrown out at each systole, a great disparity arises between the systolic and diastolic pressures, the pressure gradient becomes more steep, there is a longitudinal straining of the aorta, the greater curve of the arch is stretched, and you may get an aneurysmally dilated aorta. This question of storage is an important element not only in treatment but also in prognosis, and for this reason aortic regurgitation occurring early in life from a rheumatic lesion when the aorta is fairly healthy is, *caeteris paribus,* very much less serious than a similar lesion secondary to degeneration of the aorta.

The pulse pressure is the difference between the systolic and diastolic pressures, and most cardiologists hold that it should be at least a third of the systolic pressure, whereas I have long contended that when it exceeds forty mm. of mercury it is high time to be thinking of repairs. In aortic regurgitation the pulse pressure often exceeds the diastolic, and this of all heart lesions is the most likely to a rapid and sudden termination.

VELOCITY OF THE BLOOD.

Physiologists in my opinion place too low an estimate on the velocity of the circulation in the veins, capillaries, arterioles, and arteries. No doubt it is very difficult to estimate accurately the velocity of blood in the human or any other aorta, as the velocity is directly as the cardiac energy and inversely as the resistance to the outflow, the sectional area, and the viscosity of the blood. The sectional areas of different aortas vary, but so also do the size of the heart and the amount expelled at each stroke. The aorta is always distended at each systole and kept full between the beats. In a large vessel like the aorta the viscosity can be left out of account. In free aortic regurgitation and in aortas which have lost their elasticity the onward velocity chiefly occurs during ventricular systole but physiologists in calculating a normal standard deal with healthy hearts and aortas.

My method of estimating the velocity of the blood in the aorta and large arteries depends on the fall in the pressure gradient, can be applied without drawing a drop of blood, and I think is more accurate than any method previously devised. I have said that the velocity is directly as the energy of the heart and inversely as the resistance. Now the energy is fairly represented by the height of the systolic pressure, while we have seen that the resistance is considerably less than the diastolic pressure.

As the semilunar valves open, the blood has acquired its velocity head, and then the actual velocity depends on the energy or effective head *minus* the resistance to the outflow: The velocity between any two points depends not on the pressure but on the difference in the pressures. In a healthy aorta the energy is rapidly stored up in the elastic walls during systole, and paid out during diastole thus making the pressure and velocity more or less uniform; the pressure gradient is a gentle slope, and the velocity is not great. We know that the diastolic pressure must always be greater than the resistance if the blood be moving on, and therefore if we take the diastolic pressure as the lower end of the gradient, and the systolic pressure as the upper end, we must be underestimating the velocity. In the following formulæ *h* represents the height of the systolic pressure, and *h′* the diastolic or resistance, and thirteen cm. of blood are reckoned as equivalent to one cm. of mercury.

Velocity $V=\sqrt{2Gh}-\sqrt{2Gh'}$. Therefore when you have a systolic pressure of 150 and a diastolic pressure of 120 mm. of mercury you get $\sqrt{2\times980\times(15\times13)}-\sqrt{2\times980\times(12\times13)}=65$ cm. or 650 mm. per second.

On the other hand, if the systolic pressure is 150, and the resistance 100 mm. of mercury, the velocity is 1,140 mm. a second.

It is very important to maintain a healthy elastic aorta which is best accomplished by keeping a low systolic and a relatively high diastolic pressure with a moderate velocity. A healthy elastic aorta will stand a good deal of intermittent stretching and be nothing the worse for it; it is the long continued strain which works the mischief. In the long continued strain from the high systolic and diastolic pressures, such as occurs in chronic granular kidneys, the aorta becomes very atheromatous and calcareous, but not necessarily dilated, whereas, in those large dilated and hypertrophied hearts in which there is a great quantity of blood discharged at each systole and a rapid fall in the pressure gradient the aorta becomes dilated and elongated. In some of these big hearts and aortas there is no conservation of energy, and the waste of force is enormous; the output is increased, the velocity is increased, and longitudinal straining—especially along the greater curvature of the arch of the aorta—takes place. In response to this great demand for work, the heart goes on hypertrophying so long as its nutrition is maintained, but the coronary arteries are usually more or less involved, and, with the loss of elasticity in the aorta, the blood supply is not sufficiently maintained in the coronaries, and failure rapidly takes place. When the aortic valves are intact the velocity may be very great, a systolic pressure of 250 mm. of mercury and a resistance of 120 mm. gives you an estimated velocity of 2,450 mm. in the second, and this is chiefly expended during the systole. This gives rise to a marked recoil of the heart at the end of systole and to negative and positive waves in the circulation which obstruct one another.

When failure begins to set in you may find the force of the big powerful organ which shakes the whole chest only poorly represented at the periphery. In these cases the storage is defective, the pressure and the velocity are more or less intermittent, and there is an enormous waste of energy.

THE EARLY STAGES OF DEGENERATION.

When you are dealing with a case of degenerative changes in the heart and aorta, do not ransack the *Pharmacopœia* like a professor of therapeutics, but just make judicious use of a little common sense. If the *systolic and diastolic pressures be both high* with a gentle gradient you can depend upon it the cardiac muscle is still fairly healthy and the aorta fairly elastic. You should, therefore, lessen their work by devoting your attention to the periphery. Vasomotor relaxants, such as the nitrites, are here of not much value except as temporary expedients. If the patient has gouty kidneys, the purin bodies and other nitrogenous elements of food should be cut down, and the free administration of the benzoates proves useful; the bowels should be well cleared out with a good cholagogue cathartic or a brisk saline; if there be great cardiac distress with urgent dyspnea, a dose of morphine or morphine and atropine is the most effective remedy. If there be too much lime in the system, as is highly probable, all milk foods and jellies should be eliminated from the diet, and decalcifying agents such as phosphoric and citric acids and their soluble salts, should be freely used and the amount of sodium chloride cut down. The action of the skin should be encouraged and the patient should take plenty of outdoor exercise in a warm, dry atmosphere. Graduated exercise in the form of skipping, as advocated by the late Dr. Francis T. Bond, is highly beneficial. If corpulent, the caloric value of the food should be kept low and the amount of nitrogen regulated by the capacity of the kidneys.

With *high systolic and moderate or low diastolic pressures* the elasticity of the aorta is becoming impaired. I have previously said that when the difference exceeds forty mm. of mercury it is high time to think of effecting repairs. In many of these cases even when the aorta is much dilated, the second sound clear and ringing, and the heart's action irregular or intermittent, it is really marvelous to see what improvements can be brought about by careful management. The patient should be kept on a light dry, nonstimulating diet, little or no salt, and he is much better without alcohol in any form. Decalcifying agents in such cases are, as a rule, useful unless there be a sacculated aneurysm, and then it may be necessary to give lime salts. When an aneurysm occurs the systolic and diastolic pressures will fall and then the cardiac hypertrophy may disappear. Rest, dry diet, lime salts, and moderate catharsis may effect a cure. Frequently elicit the Abrams's cardiac reflex of contraction.

When there is *high systolic and low diastolic pressures, a dilated heart, and high intraventricular diastolic pressure,* such as occurs in cases of large beer hearts, the diet should be dry and nitrogenous if the kidneys be healthy; the bowels should be kept open, and a course of digitalis, squills and nux vomica or strychnine is beneficial. These are not the cases for mountain climbing—at least, not until the hydrostatic balance is restored—but a moderate amount of exercise on the level, such as walking or skipping, is useful. Abrams's cardiac reflex of contraction very beneficial.

AORTIC REGURGITATION.

When there is *high systolic and low diastolic pressures with aortic regurgitation,* the result is largely influenced by the amount of elasticity left in the aorta. If that vessel is very rigid and there is free regurgitation, there is an enormous waste of energy, the heart dilates and hypertrophies and eventually degenerates. The diet should be light, dry, and nitrogenous, the exercise moderate. A course of phosphoric acid and strychnine often answers well. If there be any elasticity left in the aorta, as shown by a not too abrupt fall in the pressure gradient, then it is well to maintain a moderately high diastolic pressure, because you thus make the circulation more uniform and do not necessarily raise the systolic pressure or increase the work of the heart. For this reason a well regulated course of digitalis and squills often does an enormous amount of good in this disease.

While a combination of these drugs increases the peripheral resistance—which is an advantage if moderate in amount—they lessen the size of the ventricle, increase the length and completeness of its contraction, diminish the residual blood, and thus lower the diastolic pressure in the ventricles. If there is any appreciable delay in the transmission of the pulse wave, the aorta is still moderately elastic. The Abrams's cardiac reflex of contraction is here of the greatest value.

CHRONIC MYOCARDITIS.

When the *systolic pressure is failing with a relatively high diastolic pressure* the cardiac muscle is getting much impaired, and if the pulse is irregular in force and rhythm the coronary arteries are much involved. In these cases the question of the free calcium ions in the blood must be considered, as you must not run any risk of sudden cardiac failure. There may be plenty of lime salts in the arteries, but the blood may be defective in free calcium ions. In such cases I find a valuable combination to be small doses of the glycerophosphate of calcium and large doses of phosphoric acid. The former drug supplies present needs, and the latter sets the lime in the vessels free. A long course of decalcifying agents has often a wonderful effect in clearing the lime out of the vessels. In these cases, especially if the pulse is infrequent, the iodine preparations are valuable, and small doses of thyroid increase metabolism and lessen the viscosity of the blood.

When the *systolic and diastolic pressures are failing and there is edema of the extremities,* a temporary rest to restore the *statu quo ante* is highly beneficial. The diet should be dry, light and nutritious, and nitrogenous if the kidneys are fairly healthy, sodium chloride should be eliminated, massage is useful, a course of cardiac tonics is necessary, alcohol is, as a rule, injurious. When the cardiac balance is restored there should be a course of graduated walking exercise, and skipping can also be commended.

In many cases of myocarditis the *right coronary artery is much more affected than the left.* In such cases the heart's action may be very irregular, and during any strain there is marked dyspnea and palpitation of the heart. There may be no edema of the extremities, but when the heart begins to fail you get congestion and edema of the lungs and portal congestion. There is often marked orthopnea, and in such cases it is often an advantage to wear an abdominal belt so as to assist the respiratory pump in supplying the right heart with blood. A good cardiac tonic in such cases consists of glycerophosphate of calcium, strychnine, and phosphoric acid. For restlessness and insomnia the patient should get morphine and atropine. The preparations of iodine are often beneficial, and if there be much flatulence the tincture is the best. All laxatives should be gentle. The diet should be dry and largely nitrogenous, and carbohydrates are perhaps best supplied in forms of glucose or malt. Exercise should be on the level.

In many cases of myocarditis, either right or left, *the irritability of the heart becomes impaired,* and in order to maintain a continuation of its contractions a certain diastolic pressure in the ventricles must be kept up. An abdominal support and an active respiratory pump assist the right heart, and for the left heart you must not reduce the arterial pressure too low—there must be some effective resistance in the aorta in order that the contraction of the left heart be not wasted, and that the heart itself is supplied with blood through its coronaries. If the costal cartilages are rigid a long course of phosphoric acid is useful, and for emphysema the citrate and iodide of sodium can be commended. The diet should be light and nutritious; in all forms of heart disease corpulence is a disadvantage.

THE ALBERT ABRAMS CARDIAC REFLEXES

For many years I have made regular use of the Abrams's cardiac reflexes in the treatment of heart disease and consider them invaluable. They are not intended to resuscitate the dead, but for revivfying the living they are inestimable. These reflexes are readily elicited by the following method: Take a medium sized cork, place an end on the seventh cervical spine and on the other end of the cork give thirty short, sharp taps with a plexor or a small hammer. Repeat this on the second dorsal spine. Wait a minute, and then repeat this series on the seventh cervical and second dorsal. Again wait a minute and repeat the third series. This procedure, if properly carried out, will reduce the transverse diameter of a large dilated heart by at least two inches, and the heart will remain contracted for one or two hours. At the same time the aorta is materially contracted, and pulsation in the suprasternal notch disappears, hence this maneuvre is of great value in the treatment of aneurysm; personally I have had many successes. Those who have difficulty in mapping out the deep cardiac area can easily feel a large thumping apex heart in the axillary line, and after percussion feel it in the nipple line.

In the case of a big heart which does not readily respond to this reflex the prognosis is bad. This reflex should be elicited several times daily, and it is much more effective than a similar number of doses of digitalis. As an aid in delineating the deep boundaries of the heart if you tap the seventh cervical spine or the acromial end of the left clavicle with the middle finger of your right hand, and at the same time carry the fore or middle finger of the left hand along the third, fourth or fifth left intercostal space, as soon as that finger reaches the border of the heart you will feel an impact of the heart against the finger, and the percussion note will become dull.

The Abrams cardiac reflex of dilatation is elicited by percussion between the third and fourth dorsal spines which stimulates the depressor nerve. This should be followed by percussion over the second dorsal, which I have termed a fixation complement as it prolongs the reflex. This reflex is exceedingly useful in true angina where there is spasm of the heart, a slow, small, firm pulse, and cardiac distress. In many of these cases there is also pylorospasm with distention of the stomach; this is relieved by giving a glass of hot water, and then percussing the fifth dorsal spine.

The best way to prevent heart disease is to preserve healthy bloodvessels, and treatment should include the peripheral circulation. Much of the modern treatment leads nowhere but to the grave.

REFERENCES.

1. *British Medical Journal*, 1906, vol. ii, p. 401.

The Facies in Mitral Stenosis and Aortic Regurgitation

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Very few who have been concerned with cardiac cases can fail to have been struck with the different appearances often presented by mitral stenotics and aortic regurgitants. Not infrequently the difference in the facies is so marked and characteristic that a provisional diagnosis suggests itself by appearance alone as soon as a patient enters the consulting room; but when we try to explain the reasons for these differences many difficulties arise, and what seems at first sight an easy problem proves to be far from simple. The mechanism of circulation and how it is deranged by valvular lesions, how the organism adapts itself when such lesions occur, and even what are the underlying causes of cardiac failure all have a bearing on the matter. So far as I know no really satisfactory explanation has yet been furnished; I am therefore venturing to discuss the question and shall tentatively put forward what seems to me the most satisfactory hypothesis in order that fuller discussion may cause it to be confirmed or refuted.

In cases of mitral stenosis, even when the lesion is well compensated, the lips and mucous membranes frequently have a cherry red to purplish tinge, the cheeks being of a bluish pink, slightly dilated venules are often seen on the face and elsewhere, the eyes are rather watery and the whites not infrequently slightly pink; dyspnea of a more or less marked degree can usually be fairly easily evoked by not very severe exercise. Cases of aortic regurgitation, on the other hand, as a rule show no signs of cyanosis. The face is generally pale and of a rather sallow tint, the eyes bright and rather staring, the whites being pale or bluish, the cheeks sunken and the lips and mucous membranes red or pale, not bluish; dyspnea is not easily evoked.

The usual explanation given of these differences in appearance is that in mitral stenosis, on account of the resistance that the stenosed orifice opposes to the outflow of blood from the left auricle, the pressure in this chamber rises, and hence there is a damming back of blood in the pulmonary veins and a pulmonary congestion which leads to an insufficient oxygenation of the blood; while in aortic regurgitation no rise in pulmonary venous pressure takes place until the mitral valve becomes incompetent, the resistance which the regurgitated blood in the left ventricle might offer to emptying of the auricle being fully counteracted by there being less residual blood than normal left in the ventricle after contraction, on account of the increased tonicity of the ventricular muscle.

At the time when the back pressure theory of the production of cardiac failure in cases of valvular lesions held undisputed sway, and back pressure was called in to account for so many phenomena, no doubt this explanation appeared quite satisfactory; but is it so satisfying now? We are increasingly tending to regard failing ventricular muscle as the cause of cardiac failure, and concentrating our attention on diminished *vis a tergo* instead of increased resistance *a fronte*.

Assuming, as I think we may safely do on the evidence from animal experiments, the hypertrophy of the right ventricle, and the tendency to accentuation of the pulmonary second sound in mitral stenosis, that there is a rise of pulmonary blood pressure, does this necessarily lead to pulmonary congestion and diminished oxygenation of the blood? The essential factor to secure adequate aeration of the blood is free exposure of a sufficient quantity of healthy blood in the pulmonary capillaries to the air in the alveoli of the lungs. If it could be shown that a rise in pulmonary blood pressure brought about a chronic condition of pulmonary edema, which, by effusion into the alveoli, prevents the access of air to the blood, then the question would be answered in the affirmative. Have we, however, any evidence of this? A rise in pulmonary venous pressure, if it exists, must entail in well compensated mitral stenotic cases a countervailing rise in pulmonary arterial pressure. Many patients go on for years with well marked stenosis and show no signs of moisture in the alveoli, yet they are slightly cyanosed. Even supposing their lungs contain more residual blood than normal, provided there is a normal amount flowing in and out at each heart beat, is that any reason why their blood as a whole should be more venous than usual? Would not the existence of more blood than normal in the lungs mean that a greater quantity than usual was exposed to the air in the alveoli and therefore had a better chance of absorbing oxygen and getting rid of carbon dioxide, always assuming that no exudation into the alveoli interfered with aeration? The main place that the blood loses its oxygen and gains carbon dioxide is in the systemic and not the pulmonary capillaries. A lagging in the systemic capillaries might cause more venous blood in the general circulation if the pulmonary circulatory and aerative factors remained the same; but it is difficult to see how a moderate increase in the amount of residual blood in the lungs could do so.

With regard to the question of a simple venous engorgement of the lungs producing edema, we have to bear in mind that there is a fundamental difference between this and a venous engorgement on the systemic side. The systemic venules and the capillaries immediately adjacent to them contain blood poor in oxygen and overladen with carbon dioxide, and therefore likely to be noxious to the capillary endothelium, while the pulmonary venules contain revivified arterial blood ready to be poured into the systemic arteries.

Since we must suppose that the amount of back pressure depends on the degree of narrowing of the mitral orifice, and clinical records combined with postmortem evidence show that very considerable stenosis may exist for years without pulmonary symptoms pointing to chronic edema of the lungs, it seems obvious, assuming all the advocates of back pressure say is true, that a very considerable rise in pulmonary blood pressure can exist for years without producing any appreciable effusion into the alveoli.

The truth appears to me probably to be that there is a rise in pulmonary blood pressure in mitral stenosis which entails more work for the right ventricle and consequent hypertrophy, but that this rise in pressure has nothing directly to do with the cyanosis seen in these cases, and is comparable to certain rises in systemic blood pressure which have similar effects on the left ventricle.

In accounting for the phenomena of the failing heart we do not now attach the overwhelming importance to back pressure factors that formerly was done, but rather look to failing muscle as the cause. In order to make clear what I have to say later I propose now briefly to explain cardiac failure on the assumption that it is due primarily to failing cardiac muscle. So that the description may be as little complicated as possible I shall assume that we are dealing with a case of pure myocardial origin without any valvular lesion.

The sole function of the heart is to deliver into the systemic arteries a certain quantity of blood at a certain pressure in every unit of time, and to force in the same time exactly the same quantity of blood at an appropriate pressure in the pulmonary arteries. What the quantity is and what is the pressure required depends on the needs of the organism at the time. The energy required is furnished by the contraction of the ventricles, the valves are purely an accessory mechanism. If we multiply the amount of blood the heart puts out at each beat by the mean pressure at which the blood leaves the heart and the rate of the heart beat, we have a measure of the amount of energy the heart throws into the general circulation in a unit of time. It is obvious that we have three variables, amount of blood thrown out at each beat, pressure and rate. All these factors may vary independently and affect the amount of energy available for forcing the blood through the vascular system and back to the heart. In regarding the systemic circulation we must avoid the error of looking upon it as one system of arteries leading to one system of capillaries which join up to form one system of veins. This may to a certain extent impart less error in considering the pulmonary circulation, though even here the arteries and veins of the two lungs are separate and distinct, but it is a fundamentally unsound conception when dealing with the systemic circulation. There is not one systemic capillary system, there are dozens.

The problems of the circulation are not concerned merely with the distribution of matter, the blood, they are also concerned with the distribution of energy, the kinetic energy imparted to the blood by the contraction of the ventricles. In dealing with the distribution of energy the analogy of the electric current may help to make the points clearer. Consider the heart as a battery and the wire from the positive pole as the aorta and that to the negative pole as the vena cava. Now connect the two wires by a dozen or more lamps in parallel, and at the ends by two lamps in series, or better, instead of lamps put resistances that are variable at will. Regard voltage as blood pressure, amperage as amount of blood, and wattage as energy, and we have a fair representation of the systemic circulation. Of course, like all analogies it must not be pressed too far, but is, I think, helpful. The lamps or resistances represent the various capillary circuits, brain, head, neck, arms, trunk, legs, skin and what not, while the two lamps in series represent the splanchnoportal system. The amount of electricity going through any lamp will vary inversely as the resistance in the lamp. If the battery was failing and it was essential to keep the first lamp alight, we could do so for a time by greatly increasing the resistance in all the others, and with a failing battery the first to feel the loss of current would be the two lamps in series.

Returning now to the failing heart. When the amount of energy generated by the contraction of the left ventricle is sufficient and an adequate amount of blood at suitable pressure is expelled, every part of the circulatory system receives its normal quantity of blood endued with sufficient energy to carry it through the capillaries and through the venules to the veins, but its return by the veins to the heart is largely determined by movements of the skeletal muscles, diaphragm, etc., Nature provides no excess of energy. When the ventricular muscle begins to fail and puts out less energy, either less blood must be expelled at the same pressure or the same quantity at less pressure, but the pressure is determined by the total resistance, and this depends on the state of contraction of the vessels which are under the control of the vasomotor system.

There is one master organ, the brain, which apparently must be served with blood at a certain normal pressure or it ceases to function, so the vasomotor system causes the arteries and arterioles to contract and the general blood pressure is not allowed to fall below the minimum required by the brain, therefore the cardiac output is lessened. All the capillary areas, however, are not affected to the same degree; probably the amount of blood and its pressure remain practically normal in the cerebral circulation almost up to the end, and the less vital areas suffer first. As the amount of energy available to force the blood through any particular capillary area lessens, the circulation through that part will be slowed down.

I have already pointed out that when the blood reaches the great veins it has, under normal circumstances, lost nearly all the energy impressed on it by the heart, and that venous return is largely due to the movements of the diaphragm and skeletal muscles. When the left ventricle is providing less energy the blood will tend to stagnate first in the venules and then in the capillaries, and will tend to accumulate in the venules. Those areas where the resistance is highest will feel the effects first, consequently, because of the double capillary area in the splanchnoportal system we can easily understand why enlargement of the liver from venous congestion is one of the earliest signs of failing heart. Because the blood lagging in the capillaries will steadily lose oxygen and gain carbon dioxide and other waste products the capillary endothelium will have its nutrition impaired and so permit fluid to exude through it, hence edema and serous effusions. The legs are the most distant and dependent parts of the body and the blood in their capillaries is exposed to the hydrostatic pressure of the blood in the veins, consequently it is not surprising that the feet and ankles are as a rule the first places to show edema when the ventricular muscle is failing. With a failing right ventricle similar effects will be produced in the pulmonary circulation. Of course in practice both ventricles are likely to show signs of failure at the same time in many cases.

It will be seen that this theory regards the mechanism of cardiac failure as depending essentially on a progressively diminishing output of energy by the ventricles, either in the form of less blood at the normal pressure, or the normal or greater quantity of blood at lower pressure, or a combination of the two alternatives, and that an almost necessary corollary is an accumulation of venous blood in the systemic venules.

In mitral stenosis we have factors which would lead us *a priori* to expect that the output of blood by the left ventricle would be lower than normal, and I believe there is evidence that such a lowered output actually occurs. Since there is a narrowing of the mitral orifice, which is not infrequently so extreme that an ordinary lead pencil is all it will admit instead of the normal three fingers, we can easily see that if the pressure on the auricular side remains the same far less blood would pass into the ventricle than under normal conditions. Of course when this degree of stenosis is reached it has practically always produced some hypertrophy of the muscle of the left auricle, but it is permissible to doubt whether even under these circumstances the ventricle is adequately filled, for diastole is not as a rule prolonged in these cases, and it is hard to suppose that any reasonable rise in pulmonary venous pressure or increased force of auricular contraction can quite counterbalance such extreme narrowing as we often see. If during diastole the ventricle is inadequately filled its output during systole will be lessened. The evidence which to my mind shows most conclusively that the left ventricular output is diminished in cases of mitral stenosis is that furnished by blood pressure observations.

It has been found by many observers that the pulse pressure, that is to say the interval between the systolic and diastolic blood pressures in the brachial and radial arteries, is much less than normal in mitral stenotics. From a large number of observations extending over several years and made by various methods I can fully confirm these statements. This low pulse pressure definitely points to a small systolic output. A diminished output might, so far as energy is concerned, be compensated for by a raised blood pressure, but the systolic pressure in the radials tends to be lower than normal rather than higher in mitral stenotics. An increased heart rate might compensate for a less output both of blood and energy and it is not uncommon to find the pulse rate raised in mitral stenotics.

Probably the organism does endeavor to correct the lesion to a certain extent both by quickening the rate and attempting to raise the mean blood pressure; hence the slight hypertrophy of the left ventricle without appreciable dilatation, which is not infrequently seen postmortem in these cases. But that these effects do not entirely countervail the diminished output is I think shown by the condition of the systemic arteries. I have been for years in the habit of carefully examining the brachial arteries in all cases I see, endeavoring to estimate with the finger the size of the artery and the condition of its walls, and have long been struck by its small size in mitral stenotic cases. The artery is not only small but feels rather firm, as if its walls were in a state of tonic contraction. I conceive the condition of affairs in mitral stenosis to be as follows:

On account of the narrow mitral orifice the left ventricle is less well filled than normal at the commencement of ventricular systole, consequently less blood is thrown into the systemic arteries at each beat of the heart; the arteries then contract to accommodate the smaller supply and to prevent the arterial blood pressure falling; the smaller supply and the arterial contraction result in the arterial side of the circulation containing less blood than normal. On account of the diminished total energy available the blood tends to accumulate in the systemic venules, and the circulation through the capillaries is slowed down so that there is a larger quantity of venous blood which, if one may use the expression, is more venous than usual. Since not a drop more blood can enter the right auricle at each beat for any appreciable length of time than leaves the left ventricle, the rate of flow through the lungs is diminished, and taking the arterial and venous blood as a whole it is less oxygenated than normal. As in mitral stenosis the ventricular muscle may function adequately for many years and we are not dealing with a steadily failing myocardium, a slight hypertrophy of the left as well as of the right ventricle occurs, and a balance is struck, leaving the circulation slower and more blood in the venules with less in the arteries than normal, but no progressive engorgement or edema of the lungs takes place.

This conception seems to me to explain the facies of mitral stenosis better than any other view of which I am aware. It accounts for the cyanosis, dilated venules and easily provoked dyspnea and other signs that make up the mitral stenotic facies.

How now are we to account for the facies of aortic regurgitation? The mechanism of this defect is totally different from that of mitral stenosis. Instead of less blood than normal being expelled from the ventricle at each beat, more is thrown out. During diastole the blood regurgitates through the incompetent aortic valves into the left ventricle while blood is flowing in from the left auricle. Consequently the left ventricle becomes dilated, and this, as Starling has shown, means that the ventricle contracts with more force, the individual muscle fibres being lengthened. Since some of the excess of blood forced into the aorta during systole regurgitates during diastole it may be said that this neutralizes the excessive output and there is an end of the matter. But the question is not as simple as that. The typical water hammer or Corrigan pulse of aortic regurgitation is known to every medical student, its sudden rise and rapid fall have often been commented upon, and the greatly increased pulse pressure, with frequently a systolic pressure much higher and a diastolic lower than normal is well known. At first sight it is very tempting to account for all the phenomena of the Corrigan pulse by supposing that the large systolic output causes a wave of high systolic pressure in the arteries, but that as soon as systole ceases and the output from the ventricle stops, the incompetent valves allow regurgitation and the diastolic pressure falls.

No doubt this is a factor in producing the Corrigan pulse, but that it is not the whole story is shown by the facts demonstrated by Stewart, that the collapse occurs while the blood is still flowing out of the ventricle into the aorta and not at the time when regurgitation is occurring. And further, clamping the abdominal aorta, which increases the amount of blood regurgitated, causes the collapsing form of pulse wave to change to an anacrotic one. The position of the dicrotic notch in graphic records of Corrigan's pulse demonstrates the same thing. Moreover, a pulse similar to Corrigan's and a capillary pulse in the lips may be observed in some cases of arteriosclerosis without aortic regurgitation, and both are not infrequently found in cases of Graves's disease and in other conditions entailing loss of arterial tone, or, as it is more usually phrased, lowered peripheral resistance.

I have seen this well marked in cases of cordite chewing. Indeed these circulatory signs at bottom depend, as does the amount of regurgitation, on the extent to which the elastic recoil of the arterial walls is brought into play, the size of the chink through which the regurgitation takes place being constant. We can conceive of at least three different ways in which material alteration of this factor can be brought about: 1, Increased rigidity, from structural change, of the vessel walls; 2, diminished tone of the peripheral arterioles; 3, dilatation with increased tone and lessened lability of the arteries as a whole.

LOSS OF ELASTICITY.

We can conceive of diminution or abolition of the elasticity of the arterial walls so that they approach or are converted into rigid tubes, in conditions like arteriosclerosis, without supposing any change in the lumen of the vessels or in the other factors. This would cause a marked capillary pulse and a large pulse pressure. Further, rigid vessels, as can be demonstrated on a schema, cause an early fall in pressure while the blood is still flowing out of the auricle. If the resistance to outflow from the arteries is sufficient the loss of elasticity would ultimately produce a rise in diastolic pressure with a further increase of systolic pressure.

LOWERED PERIPHERAL RESISTANCE.

Lowering the peripheral resistance so that the elasticity of the vessel walls is not brought into play would have in many respects the same effect as rigidity, but since the blood would escape more readily than normal from the arteries it would tend to lower the systolic pressure as well as the diastolic. This is probably the condition which occurs in Graves's disease and is most likely caused by a lowered tone of the arterial muscles. If either increased rigidity or lowered tone occurred the resistance of the arterial wall to dilatation would diminish, and with the large systolic output in aortic regurgitation stretching would be likely to occur. In both these cases the enlargement of the arterial river bed would be a passive process.

ACTIVE DILATATION OF THE ARTERIES.

It is conceivable that an active dilatation of the arteries may occur, their lumen being held open with their walls in a state of increased tone, and so less labile or resilient than normal. Experimental work is wanted on this question, but the existence of longitudinal as well as circular muscle fibres in artery walls should prevent us denying its possibility. It would explain some features of aortic regurgitation, such as the curious fact demonstrated by Leonard Hill that often the systolic blood pressure is higher in the leg than the arm in aortic regurgitation when the patient is in a recumbent position, as well as some phenomena of other pathological conditions.

The theoretical considerations just discussed lead us to infer that in aortic regurgitation the arterial system is more dilated than normal. The total cross sectional area of the arterial tree steadily increases from the aorta to the arterioles. Since the increased output from the ventricle is first pumped at high pressure into the narrowest portion, the aorta, this is where such dilatation should first be sought. X ray and postmortem findings show definite dilatation of the aorta and its arch in the great majority of patients with aortic regurgitation. It may be argued that these are syphilitic cases and that the dilatation is not primarily due to the regurgitation but to the mesarteritis that has produced it, but dilatation is often seen in purely rheumatic cases where no question of syphilis arises, and in which the aortic wall appears healthy postmortem.

Examination of the brachial artery has satisfied me that in aortic regurgitants it is usually larger than normal, and its wall gives the impression of being in a state of increased tone. It has been shown by T. Eastman from measurements of the skin temperature in typical aortic regurgitation that the peripheral vessels are actually dilated. But a dilated arterial system means a larger blood content, and if the total amount of blood in the body remains constant there must be less elsewhere. Evidence of a total increase is lacking in these cases and the frequently pale appearance of the patients suggests that the capillaries contain less blood than normal. That this paleness is not due to anemia is shown by blood examinations. Cases of aortic regurgitation with very pale lips and mucous membranes frequently have normal blood counts and hemoglobin content. The veins and venules when compensation is good are not distended and present a marked contrast to mitral cases. It therefore appears to me that in pure aortic regurgitation the arterial system contains more blood than normal, the aorta and large vessels being more dilated in proportion than the smaller ones, and that the capillaries contain less blood than usual, the veins also being less well filled.

If the net output from the left ventricle in these cases is greater than normal, as the great dilatation and hypertrophy of the left ventricle suggest, the right ventricle has more blood to deal with at every beat and the concurrent dilatation and hypertrophy of the right ventricle usually seen in aortic regurgitation receives a simple explanation. Moreover the whole circulation, including that through the lungs, is quickened and the oxygenation of the blood increased. But whether the excess in output by the left ventricle is more than, or only just sufficient to counterbalance the amount of regurgitation during diastole, the existence of more blood on the arterial and less on the venous side of the circulation causes the blood as a whole to be more arterial than normal. Since the blood, as I have endeavored to show, tends to accumulate in the opaque walled arteries and arterioles rather than in the capillaries and venules, the patient is pale and the other facies of aortic regurgitation are accounted for.

Before this hypothesis I have set forth is firmly established a certain amount of experimental work is required, but I think there is already sufficient evidence in its favor to justify putting it forward.

To sum up, in mitral stenosis the blood as a whole is more venous than normal and tends to accumulate in the systemic venules, and the circulation tends to slow down, while in aortic regurgitation the blood as a whole is more arterial than normal and tends to accumulate in the systemic arteries and the circulation tends to quicken.

The Meaning of Tachycardia in Relation to the Mechanism of the Responses of the Heart

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Every practitioner knows that what is true of the laboratory is not necessarily true of the sick room. The living body is never simple as an experiment often is, but a living body reacts to its surroundings and so escapes being overwhelmed by them. This essential fact of reaction has often been overlooked, yet in everyday life we accept it as the merest commonplace. For example, if we strike a strong man the resulting effect is much more likely to be an active resentment than a passive collapse. The elements of collapse are present, no doubt, but they are obscured or rather replaced by the elements of active resentment.

Now it has long seemed to me that in physiological experiments reaction of this kind is largely prevented. The physiologist seeks what he calls simple answers to simple questions, so he compels the strong man to suffer the full effects of the blow as if he were a mere child. The result is that the physiologist describes the effect of the blow as collapse and goes into details about the symptoms of the collapse which he has witnessed. Later, the practitioner, repeating the experiment at the bedside, that is, when the strong man is free to retaliate or react, obtains not collapse but very active response.

Bewilderment fills the mind of the physician thereafter, and he begins to doubt the value of work which just at present he is being told on every hand is vital to his practice. The physiologist, on the other hand, is too apt to assume that the physician has blundered because he is ignorant of "scientific" methods. Yet, as we can easily see when we deal with a simple illustration, both physician and physiologist are right. It is quite true that if you tie up a strong man and strike him heavy blows you will "lay him out." It is equally true that if you strike him heavy blows in the ordinary course of things you will render him more and not less active.

If we keep this picture in mind we learn to see in every response of the body through stimulation from the outside world—and also from the inside world—a double mechanism. There is, first of all, the direct and immediate effect of the stimulus, and, in the second place, there is its indirect effect—the reaction which it provokes. This latter is the angry recoil of the strong man. In normal individuals recoil is strong enough and swift enough almost, if not completely, to obscure any direct effects. Consequently, the clinical observer usually regards it—the recoil—as the direct effect of his stimulus. He misses out, in fact, one link of the chain: stimulus—direct effects—recoil. Thus he forms an incorrect opinion of the direct effects of stimuli. He is really making the mistake of supposing that the direct effect of a bullet shot at an animal is the subsequent attack of this animal on the sportsman. The direct effect of the bullet, on the contrary, is exactly the reverse of energizing, as we perceive the moment we think of its direct effect when it happens to reach a vital spot. The attack by the animal, in fact, is a recoil, an attempt to remove or neutralize or mitigate the direct effect. If the direct effect happens to be very severe, recoil or reaction will not take place.

This point appears to be fundamental, nor was I able to see any light in my study of the pulse rate until I had grasped it, for I found that whereas physiologists promised one kind of effect from a stimulus or a drug, I myself constantly obtained another kind of effect. At last it dawned on me that we were dealing with different things but calling them by the same names.

Let me offer one simple illustration. On the experimental table vagal stimulation slows the pulse but in practice methods employed to this end always result in quickening it, even if a temporary slowing may at first occur. There is, in short, a recoil against the vagal action. In other words, the most obvious clinical result of vagus stimulation is increased pulse rate. Yet what physician, finding a quick pulse would ascribe it even indirectly to vagal causes? In practice he would—he does—fall back on his physiological knowledge and say that the vagus was weak or the sympathetic overactive. And thus, as I hope to show, the meaning of tachycardia and its associated symptoms is overlooked. The rapid pulse rate, so charged with significance, remains what Sir James Mackenzie has called "a mute symptom." Worse than that, tachycardia is looked upon as a disease and treatment is planned to remove it. This is comparable to an effort to stifle the cries of a child who is being bitten by a dog. It is the dog, not the crying, which must be stifled if a real therapeutic result is to be obtained.

Before we can approach this aspect of tachycardia, however, we must form a clear idea of the relationship existing between the heart and the outside world. We are all aware that our hearts respond to the changes in our environment and circumstances. If an enemy approach they quicken. If there is need for effort they respond to that need. A vast amount of attention has been devoted to this question and most beautiful experiments have been carried out to show the manner in which the heart muscle responds to any increase in the amount of blood which it is called upon to handle. But these experiments do not really carry us further in the enterprise on which I am now embarking, for they do not answer the question in what way the heart responds to the calls made on it or to it by the special senses.

Let us look the problem in another way. There are two methods by which the heart can increase its output. It may, 1, afford a larger output to each beat, or 2, afford a larger output each minute; that is to say, it may augment and give larger beats or it may increase the number of its beats in a given space of time. Again, it may do both of these things. Augmentation, or increased output to each beat, is its first means of response. How is augmentation brought about? Evidently by a larger diastole. There is no other conceivable way. But this larger diastole must be brought about through nervous influences for it takes place instantaneously on the stimulus reaching the eye, for example, the sight of approaching danger. The lay public recognizes this clearly and in describing a shock often says, "when I saw it my heart stood still." What are these nervous influences? They must be vagal since the vagus is, in the expressive phrase of Luciani, "the nerve of diastole." That is to say, stimuli from the outside world must reach the heart through the vagus. That they do so reach the heart I am convinced, for I have been at great pains during many years to collect data bearing on the subject. I cannot in the space of this article present even a small part of this evidence.

A record of the pulse rate during an emergency operation for appendicitis was made with a polygraph and every six second period charted. The point to which I desire to draw attention is that when the skin incision was made the pulse rate fell from 100 to 80 beats a minute in the space of six seconds.

A similar record was made of the pulse rate during an operation for the removal of the tonsils. At each use of the tonsillotome there was a sharp and decisive fall in the pulse rate. These clearly are vagal effects. They represent a passage of the stimulus received by the skin and buccal mucous membrane to the heart. I would urge the reader, however, to note that they are of exceedingly short duration and that, had a polygraph tracing not been made, they would have been missed. In each instance they were followed by a sharp rise in pulse rate (recoil) which considerably exceeded the original rate. This may be expressed in the following way.

Stimulus	*Direct effect*	*Recoil*
Operating knife	Slowing twenty beats	Quickening ten beats above resting normal
Tonsillotome	Slowing fifteen beats	Quickening fifteen beats above resting normal

The recoil was of much longer duration than the direct effect and must have appeared to any one but a very careful observer to be the direct effect. The ordinary observer would, therefore, have stated that the result of incising the skin or cutting a tonsil was quickening of the pulse. In other words, he could have looked on these stimuli as sympathetic excitants.

It is obvious, however, from a study of the charts, that, on the contrary, the stimuli were vagus excitants and that the sympathetic came into play only when the recoil took place. Our table therefore becomes:

Stimulus	*Direct effect*	*Recoil*
Incision, etc.	Vagal	Sympathetic

Now let us apply this to the responses of the pulse rate met with in everyday life. It is manifest at once that the degree of the recoil will always vary with the strength of the stimulus. It is not less evident that it will vary also with the excitability of the vagus. Should the vagus be more excitable than normal the direct effect of any stimulus will be greater than normal and therefore the recoil will also be greater than normal.

Let us for a moment make an assumption and take it for granted that the toxins of certain diseases act by increasing vagus excitability. So long as these toxins are present every stimulus from the outside world will produce a greater direct effect and a greater recoil than it would produce in a healthy man. But all day long small stimuli are reaching us from the outside world and producing small recoils which are expressed in our pulse rates. Therefore, we might expect that if a toxin should increase vagal excitability these small stimuli would produce a more or less continuous exaggeration of recoil—that is to say, a more or less continuous tachycardia. Thus:

HEALTHY MAN

Stimulus	*Direct effect*	*Recoil*
Ordinary stimuli of life received by eyes, ears, skin, etc.	Scarcely appreciable	Slight variations of pulse rate

TOXIC MAN (toxin acting on vagus to excite it)

Stimulus	*Direct effect*	*Recoil*
Ordinary stimuli of life received by eyes, ears, skin, etc.	Tendency to faintness and weakness	Tachycardia

It occurred to me that it might be possible to prove this hypothesis or disprove it by the use of atropine. This drug, as is well known, exercises an inhibiting or deexcitant action on vagal endings. I argued, therefore, that if I gave a very small dose of atropine to a patient with tachycardia, if my hypothesis was correct, the pulse rate would become slower, for the effect of the small dose would be to reduce the abnormal excitability of the vagus to normal dimensions. Recoil would therefore be less well marked. If the analogy may be used one would be giving a sedative to a noisy patient and so silencing his cries. Accordingly, I selected four patients presenting pulse rates of 106, 105, 98, and 85, respectively (these rates representing averages of not less than ten minute readings with the patients at complete rest). To these I added one patient with a rate of 68 as a control. I gave to each of these patients one two hundredth of a grain of atropine intravenously. In each of the cases—but not the control case—immediate slowing occurred. The following table summarizes the results:

PULSE RATES A MINUTE

Case	*Before atropine*	*After atropine (1/200 gr. intravenously)*	*Fall*
A.	105	82	23
B. (control)	68	80	rise
C.	98	70	28
D.	85	58	27
E.	108	85	23

I have repeated this experiment time and again using one one hundredth grain atropine subcutaneously and one two hundredth grain intravenously. The result has always been the same. I am aware that by some of the observers it is ascribed not to a reduction of vagal excitability—as I believe to be true—but to an increase of excitability, the theory being that atropine in small doses irritates the vagus instead of inhibiting it. If this were correct, however, the control cases would behave exactly as the tachycardia cases do and it is my experience that their behavior is different.

Nor am I disposed to attach much greater weight to the criticism that if my hypothesis was correct larger doses of atropine should also slow the pulse in cases of tachycardia, whereas in point of fact they increase its rate. Those who make use of this criticism fail to recognize the nature of vagal activity. They are thinking in terms of inhibition, that is, of "the brake on the wheel." For the reasons I have given I regard the vagus as rather an active partner in the mechanism of cardiac augmentation, i. e., as the nerve of diastole. The moment this view is taken it becomes manifest that so powerful an inhibition of the vagus as that produced by, say one thirty-third grain of atropine subcutaneously or one fiftieth grain intravenously, must practically bring the mechanism of augmentation to a standstill. Only the other mechanism, acceleration, will now be left to the heart, that is, "output a minute." If to a patient whose pulse rate has been increased by a large dose of atropine (one thirty-third grain given subcutaneously) a further dose of one one hundredth grain is given, no slowing whatever occurs. In other words, this type of tachycardia differs fundamentally from that in which small doses of atropine produce slowing.

I satisfied myself, then, that there exists a group of cases presenting a rapid pulse rate in which the immediate cause of this rapidity is an excitable vagus. The excitability of the vagus is clearly due to the presence of a toxin because a tachycardia can be shown to vary directly with the toxic symptoms which are present. The tachycardia, therefore, is a recoil symptom or a symptom of reaction to a poison, the specific effect of which is exercised on the vagus nerve or rather on the whole parasympathetic system. So long as the tachycardia persists we are entitled to assume persistence of infection. Space will not permit my elaborating this aspect of the question. Let me merely state categorically that I believe rheumatic fever, rheumatism (that mysterious disease), diphtheria, septic conditions, and perhaps syphilis, are due to infections, the toxins of which exercise this specific action on the vagus system. I believe, too, that such symptoms as exhaustion, breathlessness, palpitation and tremor can be explained, to some extent at least, in terms of vagus excitability.

I have dealt with these questions at great length in my book entitled *The Clinical Study of the Early Symptoms of Circulatory Disease.* In this article I am more greatly concerned with the completion of the wider view of cardiac response which I have already introduced in speaking of reaction to stimuli from the outside world. I would urge with all the earnestness at my command that these are not the only stimuli which reach the heart. There are also the stimuli from the inside world, the other organs of the body.

I asked myself whether or not these inside stimuli also reach the heart through the vagus. A very long process of investigation negatived that idea and I came at last to perceive that inside stimuli act directly on the sympathetic. The vagal picture so characteristic of them is a recoil picture. This may be seen in the pulse rate during an operation for appendicitis. It will be noted that after the muscles had been incised and the peritoneum was being handled the pulse rate rapidly rose to 120, but that, as the manipulations of the bowels were carried on, the rapidity (direct effect) gave place to slowing (recoil), until the rate had sunk to some 55 beats a minute—an overwhelming vagal picture.

A further illustration of the fact that stimuli from inside act directly on the sympathetic is afforded by the rise in pulse rate occasioned by eating two buns. Eating always has this effect, but later when the meal is digested the rate falls (vagal recoil). It has, of course, long been recognized that the entry of food into the stomach produces an inhibitory action which, however, is soon followed by increased peristalsis. The sympathetic effect on the heart—quickening—speedily gives place to slowing—vagal recoil—in cases in which the stimulus is severe (gastric disturbance) or in which the vagus is already excited by a toxin. Food on reaching the stomach acts as a mild stimulus of this kind. Severe stimulants, in my opinion, are ulcers of the bowels, gallstones, and various displacements of organs, e. g., floating kidney and uterine displacement. The manifest object of the vagal recoil in these cases is the removal or suppression of the stimulus.

We may now, therefore, set down in tabulated form the mechanism of outside and inside stimulation:

Stimulus	*Direct effect*	*Recoil*
From outside	Vagal Slow pulse	Sympathetic Quick pulse
From inside	Sympathetic Quick pulse	Vagal Slow pulse

In each case it is the recoil which is in evidence rather than the direct effect of the stimulus and consequently symptoms as a whole are more often recoil or reaction symptoms than direct effect symptoms. Thus, a fainting attack (vagal) is more likely to be due to a strong stimulus arising from the viscera than to a shock from the outside world. On the other hand, palpitation is more likely to be due to an external than an internal stimulus. It is usually due to an excitable state of the vagus.

The practical applications of this view of symptoms are very numerous. I cannot go far into that aspect of the question but I should like to quote one or two cases by way of illustration. I make no apology for the manner of labeling them.

CASE I.—PATHOLOGICAL STIMULATION FROM INSIDE, SYMPTOMS THOSE OF VAGAL RECOIL.

The patient, a young married woman, was a champion tennis player, and in splendid health until her first and only confinement. She walked fifteen miles shortly before delivery. After the birth of the child she became exhausted. There was no breathlessness and no palpitation but she was told that her heart was dilated and that there was a systolic murmur. She had fainted on several occasions, notably when her monthly period was present. Once she fainted half an hour after a full meal. Her heart had its left border in the nipple line and there was a faint systolic murmur. Suspecting uterine trouble I had her examined by a gynecologist, who found a tear and a displacement and operated. She made a complete recovery in a short time. In this case strong internal stimuli flowed from the misplaced uterus, especially when it was swollen at the menstrual period. The symptoms, too, varied to some extent with change of posture.

CASE II.—NORMAL STIMULATION FROM OUTSIDE, ACTING ON A VAGUS EXCITED BY THE TOXIN OF TRENCH FEVER.

The patient was a soldier who had been quite well until he contracted trench fever, which ran a chronic course, and he became breathless on exertion, and suffered from palpitation, pain over the precordium, and giddiness. He was told that he had heart disease. There was no evidence of this but examination revealed the presence of chronic trench fever. Exercise and special treatment greatly improved him though he still suffers from febrile relapses.

CASE III.—NORMAL STIMULATION FROM OUTSIDE, ACTING ON A VAGUS EXCITED BY THE TOXIN FROM CHRONIC APPENDICITIS.

The patient was a schoolboy, weak and pale, and supposed to have "severe heart disease," and a systolic murmur. He was not allowed to exercise and was unfit to do so in any case. There was a history of bilious attacks of a slight character. The appendix area was extremely tender both to pinching of skin and to deep pressure. An operation was performed and the appendix removed. A collection of pus was found in the appendix and some free fluid in the right iliac fossa. Two years after operation the boy was absolutely transformed.

It will be seen that the heart condition in these cases represented only a symptom. In Cases II and III there was more or less persistent tachycardia: the patient in Case I had a very slow pulse. This is the usual finding, as might be expected, though there are exceptions which would occupy too much space to describe in detail. It will be seen, too, that outside stimuli rarely give rise to symptoms which can be mistaken for diseased symptoms. In this group of cases a toxin is acting on the nervous system. In the other group toxic influences are much less important than the mechanical stimuli set up by disease or displacements of organs. This we may represent as follows:

1. SYMPTOMS REFERRABLE TO SYMPATHETIC RECOIL

Stimulus	*Direct effect*	*Recoil*
Normal from outside	Vagal exaggerated owing to presence of toxins	Sympathetic

2. SYMPTOMS REFERRABLE TO VAGUS RECOIL

Stimulus	*Direct effect*	*Recoil*
Pathological from diseased or displaced organs	Sympathetic not exaggerated in relation to severe stimuli	Vagal

Treatment in the first group must necessarily be directed to the removal of the sources of the toxin or to its elimination. In the second case it must be directed to the removal of the pathological stimulus. Obviously both troubles may be present at the same time in the same individual; for example, a woman with a retroflexion who also has pyorrhea. Cure of the one will, in my experience, help matters considerably; but real recovery depends on the cure of both.

So far as the heart itself is concerned, I come more and more to regard its troubles as secondary to troubles elsewhere. I speak without exaggeration when I say that most of the cases of heart disease which come to our consulting rooms are not cases of heart disease at all. What I now wonder is whether all cases of heart disease were not, at some time or other, something else which, if diagnosed early and properly treated, would have given rise to no further trouble. I am continually struck by the fact that it is the persistent infection, not the acute infection, which produces the heart patient. The great influenza epidemic left few damaged hearts behind it, but rheumatism and septic conditions are fruitful breeders of this kind of trouble.

In conclusion, I would urge my professional colleagues in America to pardon the apparently personal character of this paper. I have thought it best to "speak for myself" but I owe nearly all my work to the help of others, especially to Sir James Mackenzie and to Major John Carroll, of the United States Army, now in practise again in his own country. His inspiration during the time we worked together was as unfailing as his courtesy and kindness.

The Premature Contraction and Its Significance

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EXTRASYSTOLES AND THEIR SIGNIFICANCE.

It is probably correct to say that there are few manifestations of cardiac disorder so obvious to both the patient and the doctor as the condition spoken of as the premature contraction or extrasystole. To the patient the condition makes itself obvious by such sensations as sudden stoppage of the heart, which may or may not be associated with a feeling of giddiness or even faintness. Violent throbbing in the throat or chest. Bumping against the chest wall. Sudden palpitation, or fluttering in the chest, not infrequently associated with a sense of cardiac oppression or even dyspnea, while to the physician the condition is made manifest by the character of the pulse, which may exhibit either an occasional incomplete or complete irregularity, be coupled (bigeminus) or run in threes (trigeminus), the peculiar character of the apex beat, and the variation in the heart sounds on auscultation.

These manifestations may occur intermittently or be continuous. In the former case they may appear at certain times, or under certain definite conditions, such as after meals, exercise, smoking or drinking tea or may appear in the course of some definite disease such as pneumonia, rheumatic fever, malaria, typhoid or influenza. They may disappear again on ceasing the particular actions associated with their appearance, or after the associated disease has quieted down. They are not infrequently brought on by deep breathing and are often caused to disappear by exercise or fever. On the other hand, they may be developed or increased in frequency by exercise—a point of great importance to note in connection with prognosis and treatment.

In late stages of pregnancy (eighth month) they are practically always present. They are most commonly of all found in association with organic disease of the heart and vessels. They occur at all ages but are most common after fifty, and are more common in men than in women. Premature contractions usually occur in slow hearts, hence are common in heart block, rare in fast hearts (hence their apparent rarity in Graves's disease and febrile conditions generally). Premature contractions may occur at practically any point in the diastole, and may or may not open the aortic valves. Furthermore, they may originate at any point in the cardiac tube, hence it is common to classify them into auricular, ventricular or nodal; according to their origin, in auricles, ventricles or nodal tissue respectively. Occasionally the ventricle not only responds to the premature stimulus, but also to the ordinary auricular stimulus —when this occurs the extrasystole is said to be interpolated—usually the ventricle responds to an auricular extrasystole, but occasionally the stimulus is delayed in transit, when the premature contraction is said to be blocked. Occasionally the ventricle does not respond at all, when the pulse is usually slow and irregular.

DIFFERENTIAL DIAGNOSIS.

Differential diagnosis of the different types is often of the greatest importance, and although various suggestions have been made to enable one to do so, it seems to me that the only reliable method is the electrocardiographic—the electrocardiogram enabling one to tell at a glance whether the extrasystoles are auricular, nodal or right or left ventricular in origin. Polygraphic records may at times enable one to form some idea as to the nature of the extrasystole, but the records are difficult to interpret accurately and easy to misinterpret.

The presence of a well marked compensatory pause on auscultation will often enable one to distinguish between auricular and ventricular extrasystoles (in the case of the former the pause often being incomplete). Multiple auricular extrasystoles give rise to an irregularity which by ordinary methods is indistinguishable from auricular fibrillation, while blocked auricular extrasystoles may easily be mistaken for true heart block. These facts are all more or less common knowledge, but when one comes to consider the different views held as to the nature, significance, prognosis and treatment of premature contractions, one finds much confusion. With a view to correlating the different observations and finding, if possible, some common basis for the condition, I have made many thousands of observations on healthy (?) and definitely diseased hearts, and on these observations have based the following conclusions: All premature contractions indicate a definitely hyperirritable state of the myocardium—hyperirritability may depend on many different causes, some of which are serious and intracardiac in origin, while others are extracardiac and may be of comparatively little importance. The commonest extracardiac cause of myocardial hyperirritability is pressure. Myocardial hyperirritability resulting from pressure is well seen in pregnancy, after the eighth month, in which the heart is almost always irregular, due to premature contractions, distention of the stomach, and in abdominal tumors, and other causes.

The commonest intracardiac or intrinsic causes of myocardial hyperirritability are: a, degeneration, b, inflammation, c, toxemia, and d, exhaustion.

EXTRASYSTOLES IN MYOCARDIAL DEGENERATION.

The association of extrasystoles with myocardial degeneration is well established and recognized but one might simply mention that they most commonly occur after fifty years of age, when the cardiovascular system is definitely degenerated, and are frequent antecedents to such definitely degenerative conditions as auricular fibrillation, or heart block, associated with generalized myocardial change.

The association between extrasystoles and inflammation is often well seen in the course of an attack of rheumatic fever. The patient perhaps has well marked signs of endocarditis or pericarditis, but as far as one can tell the myocardium has escaped damage. The heart then becomes irregular and owing to the development of extrasystoles, this almost invariably means that the inflammation has spread through to and involved the myocardium.

The connection between toxemia and extrasystoles is well appreciated when one considers such conditions as malaria, typhoid, influenza, excessive tobacco, and other causes. In these cases irregular action of the heart is well recognized and is almost invariably due to extrasystoles; generally speaking all parts of the heart are involved so that the irregularity of the heart is considerable, sometimes the auricles, sometimes the right and at other times the left ventricle showing premature beats. During the war the writer saw hundreds of cases of D. A. H. of this type. The influence of tobacco in producing cardiac irregularities is well known and was a recognized method in the war of evading military service. Some persons appear to be especially susceptible to its action. The writer, for instance, can easily produce extrasystoles in himself by smoking even two or three cigarettes, and if the smoking is persisted in, violent paroxysmal tachycardia results.

Perhaps the worst irregularity of the heart I have ever seen was in a man who was allowed to leave Germany during the war owing to the serious state of his heart. The heart was wholly and completely irregular, due to multiple extrasystoles occurring irregularly at any or all parts of the cardiac tube. The condition was produced by the excessive smoking of green cigars and the drinking of black coffee! The heart returned to normal with the stopping of the drugs.

EXTRASYSTOLES IN FATIGUE.

The relationship between extrasystoles and fatigue is especially interesting, as the premature contractions may be associated either with a general physical exhaustion and only occur after actual bodily physical effort, or be simply associated with either generalized or local myocardial exhaustion or fatigue. For example, in mitral stenosis there may be fatigue of the right ventricle or left auricle, quite apart from bodily physical effort and the expression of the fatigue will be either right ventricular or auricular extrasystoles.

Extrasystoles which only appear or increase after physical effort, always in the opinion and experience of the writer, indicate myocardial fatigue or damage and one might point out here that any irregularity of the heart which develops after or upon exercise, whether the irregularity be due to extrasystoles, auricular fibrillation, auricular flutter, or any other cause, must always be looked upon as serious and indicative of some definite myocardial disability.

Referring again to more or less localized cardiac fatigue, many interesting points might be mentioned. Take, for example, mitral stenosis, if one follows up these cases carefully one usually finds between the nonfibbing and the fibbing stages, a period in which the heart becomes irregular owing to multiple auricular extrasystoles. The appearance of auricular extrasystoles in a case of mitral stenosis must usually be regarded as a danger sign that auricular fibrillation is about to set in. Not infrequently they lead to actual paroxysmal tachycardia. Paroxysmal tachycardia occurring in a mitral stenosis may be due either to auricular extrasystoles, auricular flutter or auricular fibrillation. The differential diagnosis is of some importance, as the treatment should be profoundly different. Bleeding will often stop auricular extrasystoles in these cases.

In pneumonia, again, the appearance of extrasystoles of right ventricular origin must always be regarded as serious, as they usually indicate a liability to right ventricular failure. Again, take one of the commonest forms of D. A. H., as met with in the man over forty years of age, the basis of this condition is usually arteriosclerosis . . . the mechanism of production being arteriosclerosis, cardiac overwork resulting in fatigue, the expression of which is the extrasystole leading to cardiac irregularity, equals D. A. H.

AORTIC REGURGITATION.

In aortic regurgitation again, it has been recognized for many years that the appearance of any irregularity of cardiac action increased the seriousness of the prognosis. The commonest irregularity in aortic disease is that due to left ventricular extrasystoles caused by left ventricular fatigue—they are often the first sign of aortic failure.

Again if one considers complex lesions such as associated aortic and mitral disease in the course of which extrasystoles are certain to occur, an examination and consideration of the extrasystoles will often enable one to tell which side is most embarrassed and most likely to fail a point of the greatest value in the practical treatment of such cases.

Auricular extrasystoles are almost always intrinsic in origin and associated with some definite pathological condition of the myocardium, and hence are often persistent. They frequently give rise to paroxysmal tachycardia, this in turn is likely to produce serious fatigue and failure which is specially serious if associated with either an aortic lesion or extensive ventricular myocardial damage. The first point, therefore, which I have tried to bring out and emphasize in this paper is that *hyperirritability is a definite stage or phase in certain physiological or pathological conditions or processes, and that the extrasystole which is an expression of myocardial hyperirritability must be regarded as an obvious and forcible demonstration that this stage has been reached.*

The second point that I want to draw attention to is that extra systoles whether of intrinsic or extrinsic origin, are important on account of the fact that they frequently produce *sudden increased intravascular strain.* If a ventricular extrasystole occurs early in diastole, i. e., when there is little blood in the heart little blood if any is forced into the vessels and little, if any, intravascular strain is produced, but if, on the other hand, the premature contraction occurs relatively late in diastole, the ventricle is comparatively full of blood which is ejected with considerable force, so that the vessels may be subjected to considerable sudden strain. In some cases where the vessel walls are definitely degenerated, the results may be most serious. The sudden intravascular strain which may be produced by extrasystoles, even of extrinsic origin, must always therefore be borne in mind.

In conclusion, lest anyone should think these views have been hastily put forward, I might say that they have been based on observations carried out over ten years on 13,231 cases.

GENERAL SUMMARY AND CONCLUSIONS.

A. Extrasystoles indicate hyperirritability of the myocardium.

B. Hyperirritability of the myocardium is produced by either extrinsic or intrinsic causes—the latter being by far the most important.

C. Hyperirritability represents a definite stage in the physiological process of fatigue and the pathological conditions of inflammation, degeneration, and toxemia, hence extra systoles are indications or manifestations of such conditions.

D. Extrasystoles are important according to: a. The nature of the underlying condition. b. The amount of intravascular strain and amount of circulatory disorganization they produce.

E. Auricular extrasystoles are practically always intrinsic in origin and usually indicate definite damage to the auricular myocardium. They often precede flutter and fibrillation and give rise to paroxysmal tachycardia.

F. Right ventricular extrasystoles are often extrinsic in origin and due to pressure, but they may be intrinsic, when they usually indicate right heart strain or exhaustion.

G. Left ventricular extrasystoles often indicate left ventricular fatigue and precede failure, especially in aortics.

H. Extrasystoles of any type in complete heart block seriously disorganize and embarrass the circulation and must always be regarded as serious.

Cardiovascular Disorders Produced by Disease in the Digestive Tract

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The well being of the heart and bloodvessels depends in many ways upon that of the alimentary tract. Sometimes the relationship is a simple one, as when the heart beats faster in response to irritation by a collection of gas in the fundus of the stomach, but in other cases the connection is less direct. Under the conditions which obtain when the intestines are the seat of chronic stasis bacteria work harm by generating poisonous substances from the food and by direct invasion of the tissues. In accordance with these methods of production the lesions which arise may be divided provisionally into two groups, the toxic and the infective.

LESIONS OF TOXIC ORIGIN.

POOR CIRCULATION.

Persistent coldness of the extremities is one of the commonest symptoms of intestinal toxemia of the putrefactive type. The ears, nose, toes and fingers become blue in temperate and in cold weather and scarlet in hot weather. The coldness of the feet at night interferes with sleep and in winter time chilblains and socalled dead fingers are very common. Although the extremities are affected to the greatest extent, the condition can be observed in a less degree as far as the knees and shoulders. The temperature in the mouth is subnormal even when the internal temperature, as observed in the rectum, is not depressed. The coldness is objective as well as subjective and is easily recorded by a surface thermometer. The power of the skin to maintain an equitable temperature in the face of variations in the temperature of the surroundings is weakened. If a healthy man immerses his hand in ice cold water for a minute and then dries it without friction or heat, its surface temperature returns to its previous level in five or ten minutes, but if the man suffers from simple intestinal putrefaction the hand will still be cold after a lapse of half an hour.[1] Similarly after exposure to heat the healthy hand regains its normal poise after five or ten minutes, but in the condition under discussion it remains red and hot for half an hour or more. Figs. 1 and 3 show the reaction of healthy skin to the stimulus of heat and cold. Figs. 2 and 4 show the delayed reactions peculiar to this type of disorder.

The patients excrete an excess of indoxyl and other products of putrefaction in the urine but the exact chemical nature of the toxin concerned is still unknown. The condition is controlled by paraffin and aperients or by lactose (one ounce) taken with a saline purgative in a glass of water each morning before breakfast. The sugar which reaches the ileocecal region on this regimen prevents the formation of the usual products of protein putrefaction. The condition also disappears at once after the removal of the large bowel.

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[1] For the curves showing the reaction to heat I am indebted to Dr. W. C. D. Maile, who has investigated this subject very carefully.

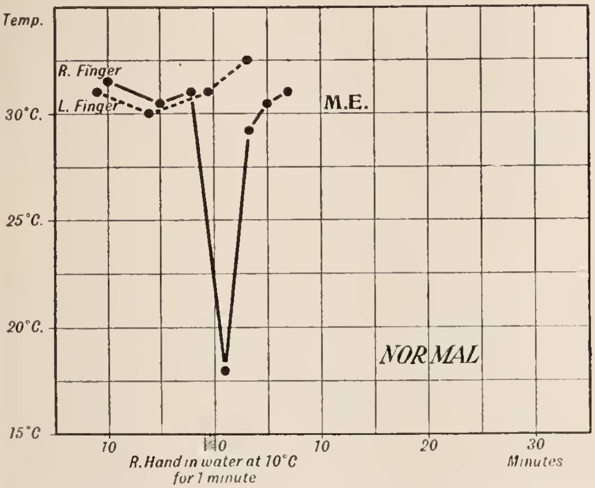

FIG. 1.—Reaction to cold. M. E., healthy adult, showing normal reaction of fingers after short exposure to cold. The left finger acted as a control.

CEREBRAL ANEMIA.

When there is a general loss of muscular tone, such as occurs in a very severe form in simple intoxication from intestinal stasis, the abdominal muscles become flabby and intraabdominal tension falls. Blood collects in the large venous reservoirs within the abdomen and the efficiency of the circulation in the brain is maintained with increasing difficulty. Patients with this condition feel at their best in the morning. As the day goes on they rapidly become tired and their cheeks and lips grow pallid. The oscillations between pink cheeks and red lips each morning and pallor at a later period in the day produce the impression that the patient has some curious anemia which undergoes marked diurnal variations. The hemoglobin content remains constant, however, and the phenomenon is simply due to local variations in the distribution of the blood. Such patients usually crave cerebral stimulants, such as caffein and obtain great comfort from their afternoon cups of tea. They tolerate hot climates very badly and feel fittest in cool bracing weather which tones up their muscles to the greatest extent.

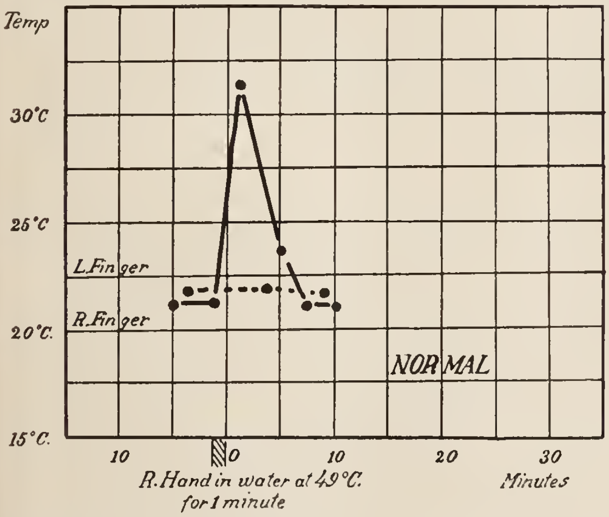

FIG. 2.—Reaction to heat. Case I. Healthy adult, showing normal reaction of fingers after short exposure to heat. The left finger acted as a control.

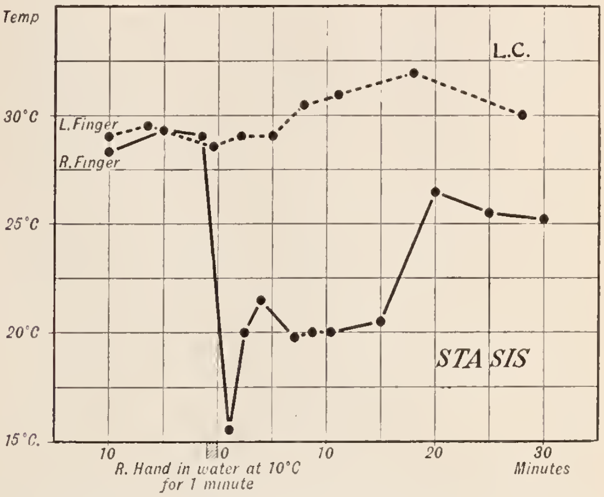

FIG. 3.—Reaction to cold. L. C., patient with chronic intestinal stasis, showing greatly delayed reaction of fingers after short exposure to cold. The left finger acted as a control.

The symptoms are easily controlled by the application of a spring abdominal belt which enables them to maintain the requisite intraabdominal tension and so facilitates the supply of blood to the brain. By this means the mental efficiency at the later hours of the day is greatly increased and the onset of fatigue delayed. The craving for tea grows less and tolerance to heat is increased, while the pink morning complexion is sustained throughout the day.

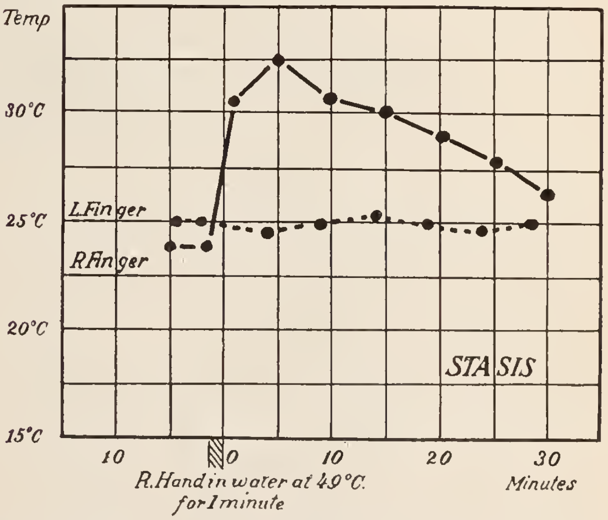

FIG. 4.—Reaction to heat. Case VIII, patient with chronic intestinal stasis, showing greatly delayed reaction of fingers to heat. The left finger acted as a control.

LOW BLOOD PRESSURE.

Certain patients with intestinal stasis relapse into a condition resembling that of Addison's disease. Their systolic blood pressure sinks to 90 mm. of mercury or even to lower figures. They experience much asthenia and a variety of abdominal pains. A deep pigmentation spreads over their eyelids and flexures and many other parts of the body until the differential diagnosis from bilateral disease of the suprarenals becomes a matter of great difficulty. The urine contains a large excess of indoxyl and similar substances and the small intestine is densely invaded by Bacillus coli. The immediate cause of the fall in blood pressure is not fully determined but the following facts are of interest. The amino acid histidine is converted by the Bacillus aminophilus into the powerful depressor substance histamine. This depressor is not destroyed by the liver so that any which is absorbed from the gut reaches the general circulation. In a series of twelve patients upon whom Sir Arbuthnot Lane performed colectomy, implantations of the ileal bacteria were made into a histidine and saline medium. In four cases the depressor amine was produced in the cultures and the systolic blood pressures as recorded in the brachial arteries of these patients before the operation was 108, 106, 102 and 97 m.m. of mercury respectively. In the remaining eight cultures, which were made from patients whose blood pressures were 140, 132, 128, 126, 125, 122, 120 and 114 m.m. respectively no histamine was formed. The low blood pressure cases were associated with an amine producing ileal flora while the small intestine of the other patients did not contain any such bacteria (2).

HIGH BLOOD PRESSURE.

Since Dale and his coworkers focused the attention of the profession on the pressor amines, which are formed from certain amino acids by the action of bacteria, it has occurred to many that these amines may be concerned in some way with the etiology of obscure but common cases of excessive arterial blood pressure. The best known pressor amine is tyramine which is obtained from tyrosin and is a powerful drug. In 1914 I isolated the corresponding hydroxyacid from the urine of a patient with intestinal stasis and high blood pressure, and at the time suggested a casual relationship between the patient's vascular condition and the formation of tryamine in his bowel (3). Later investigation, however, does not bear this out. In a systematic investigation of 236 urines obtained from hospital patients of various ages from seven years upwards I found the hydroxyacid definitely present in forty-five per cent. and in eleven per cent. the amount excreted daily was more than that which follows the ingestion of one quarter gram of tyramine by the mouth. The blood pressures of the patients who excreted these large quantities of the hydroxyacid are shown in the following table:

Percentages of Cases	*Systolic Bloodpressure*
76	Below 120 m.m. Hg.
12	150-120 m.m. Hg.
6	150-200 m.m. Hg.
6	Above 200 m.m. Hg.

There is clearly no close association between bloodpressure and the excretion of hydroxyphenolic bodies in the urine. The liver probably nullifies the pressor effect of any tyramine which is produced in the bowel since it has been shown by perfusion experiments that tyramine is readily converted into the corresponding hydroxyacid by the liver cells and this acid is an inert substance devoid of pressor action. There can, however, be no doubt that toxins of some nature are formed in the intestines and when absorbed cause a serious rise in blood pressure. Such cases are clearly recognized by the excessive amount of putrefactive products in the urine. The blood pressure can be reduced to a very beneficial extent by a diet poor in proteins and by scrupulous attention to the hygiene of the bowels.

LESIONS OF INFECTIVE NATURE.

INFECTIVE ENDOCARDITIS.

In the chronic cardiac type of infective endocarditis secondary invasion of the heart valves, which have already been damaged by acute rheumatism, usually takes place from some zone of chronic infection in the alimentary tract. Streptococcus viridans which is so common in the mouth has often been isolated from the blood stream in this condition. There is another type of streptococcus which in my opinion is of even greater importance. It grows in long chains and is differentiated from other strains by its possessing both infective powers and great saprophytic vigor. It grows as rapidly in glucose broth as does Bacillus coli and generates a high degree of acidity. When a mixture of this organism and Bacillus coli is implanted into the same tube of glucose broth, the Bacillus coli survives for a short time only and after one or two days incubation is killed by the acid produced by the coccus. Such a coccus is well equipped to survive the struggle for existence which takes place amongst the bacteria in the food residues in the bowel, and it can be recovered from the intestinal contents very frequently. In an examination of ninety-four strains of Streptococcus longus from various sources, this great rapidity of growth in sugar media was shown by eighty-seven per cent. of the colonic strains but by fourteen per cent. only of the strains obtained from chronic infections of the mouth and throat. When such cocci are found in other parts of the body their presence suggests very strongly that the infection is secondary to one in the intestines. Organisms of this type can be recovered from the mesenteric glands and also from the blood stream in certain septicemic states and especially in the variety of infective endocarditis under discussion (4).

It is most important that all patients with old rheumatic valvular lesions of the heart should be protected carefully from the evils of chronic intestinal stasis. Streptococci abound in the alimentary canal wherever carbohydrate residues stagnate. From these areas they invade the lymphatics and blood stream. If the valves of the heart have been damaged previously, secondary infective endocarditis is prone to develop with menace to the patient's life. One case will illustrate this danger.

Case I.—A man of twenty-five had at the age of eight suffered from acute rheumatism and valvular disease of the heart. He appeared to recover from the infection completely and was free from cardiac symptoms until the age of twenty-four, when he was compelled to work hard in unhealthy surroundings. He began to suffer from diarrhea and later from anemia and shortness of breath. His hemoglobin fell to thirty per cent. His urine contained two per cent. of albumen. He was pyrexial and the aortic and mitral valves were both incompetent. Blood cultures yielded a growth of Streptococcus longus of the sugar loving variety. The feces contained streptococci of a similar strain. The man died. At the autopsy the characteristic changes of fungating endocarditis were seen and the bowel showed the structural changes of chronic stasis of long duration with irritation of recent origin.

ARTERITIS OBLITERANS WITH GANGRENE.

In its fully developed form this condition is comparatively rare. It is closely related to senile gangrene, although the fact that it may attack men in the prime of life differentiates it clinically to some extent. The following case is of interest in that it shows the very close relationship which exists between the disease and chronic infections of the alimentary tract. Sir James Mackenzie and Sir Almroth Wright both saw the patient during the treatment and very kindly helped me with their valuable advice.

Case II.—W. M., a man of forty, had suffered from constipation and severe pyorrhea alveolaris for many years. His Wassermann reaction was negative, his systolic blood pressure 115 mm. in mercury and his urine was free from albumen. Obliterative arteritis had caused gangrene of the left leg for which amputation had been performed above the knee two years previously. Recently, a black gangrenous area had appeared on the stump and a larger one had begun to destroy the big toe on the remaining foot. The necrosing terminal phalanx of this toe protruded through the black ulcerated mass. The pain was intense and morphia had been used nightly for many weeks to give the patient rest. There was a majenta colored tender area of threatening gangrene on one of the fingers. The feces contained Streptococcus longus and a nonlactose fermenting variant of the colon bacillus. The latter organism was agglutinated by the man's serum in high titre. The patient was kept in bed and his bowels flushed daily with liquid paraffin. He was given a simple diet, of food which could be assimilated quickly, and his teeth were extracted. An autogenous vaccine consisting of an emulsion of streptococci and of the coliform organism was given. Each injection was followed by a great increase of the pain in the foot and by a little increase of peristalsis in the bowel for forty-eight hours. This reaction subsided slowly and it was found possible to repeat the injection every seven days in increasing doses. The redness and swelling around the gangrenous areas steadily diminished, the toe became more mobile and the pain grew less. The scab fell from the amputation stump and in five months' time the toe had healed completely so that the foot could be used freely and without pain. The patient who had come to England with the idea of submitting to a second amputation returned to South Africa with his leg intact and ready to take up his work again.

REFERENCES.

1. *British Journal of Surgery*, 1915, vol. ii, No. 8, p. 629.
2. *Quarterly Journal of Medicine*, 1914, p. 427.
3. *Proceedings of Physiological Society*, October, 1914.
4. New York Medical Journal, 1921, vol. cxiii, No. 14, p. 713.

The Heart in Chronic Pulmonary Tuberculosis

By ARTHUR LATHAM, M. D.,
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To the clinician the outstanding point in the relation of the heart and circulation to pulmonary tuberculosis is this: Healthy vigorous heart muscle and a normal blood pressure seem to act in a protective way against the development of tuberculosis in the lungs, and if tuberculosis should develop, to have a definite influence upon the process of repair and recovery. Conversely, it may be said with confidence that feebly acting heart muscle with a low blood pressure predispose to the development of tuberculosis in the lungs, and that when this disease has established itself, under these conditions, the prognosis is unsatisfactory.

When, however, we come to consider individual factors concerning the action of the heart in pulmonary tuberculosis, we are met with a surprising conflict of evidence. Take, for example, the simple question, Is the heart displaced during the progress of the disease? Some observers say it is displaced in less than three per cent. of the cases, others say it is exceptional to find the heart in its normal position! We have the same remarkable conflict of evidence with regard to most of the other points, such as the development of hypertrophy of the right ventricle, the influence of definite heart disease upon the progress of the tuberculous process, the importance to be attached to what I may call the x ray small heart, all of which might have been expected to have been definitely settled by now. This marked difference of opinion of authorities is no doubt chiefly due to the varying experience of the observers and partly to the difficulty in arriving at a correct solution, owing to the large number of factors which enter into each problem. No two cases are alike. In each the original character of the heart and circulation, the presence or absence of adhesions, the degree of diminution in the elasticity of the affected lungs, the type and distribution of the disease, the presence of complications or of other diseases, etc., make it difficult to formulate dogmatic statements: and in some instances, when dogmatic statements are made, it would seem possible that the observers have forgotten Pasteur's advice to research workers—"never find what you are looking for." Modern methods of investigation are proving of service. For instance, careful work by Boas and Mann (1) leads them to the following conclusions with regard to the idea that dilatation and hypertrophy of the right ventricle is usually associated with chronic pulmonary tuberculosis:

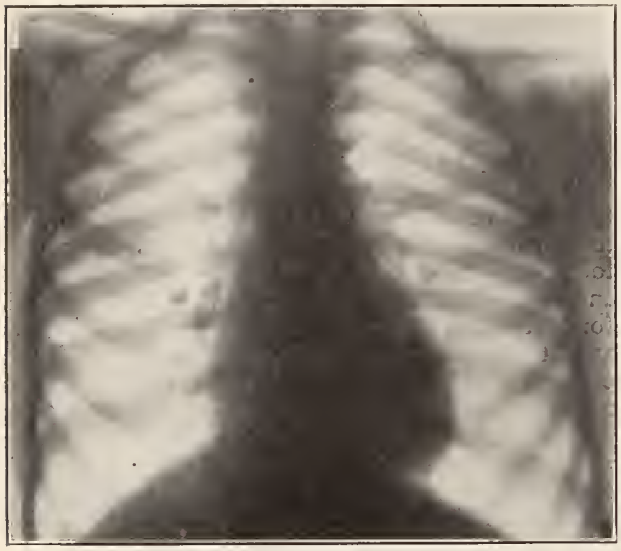

Fig. 1.—Calcareous glands at the hilum in a child.

1. An electrocardiographic study of ninety-seven patients with pulmonary tuberculosis revealed twenty-nine per cent. with right ventricular predominance, thirty per cent. with left ventricular predominance, and forty-one per cent. with no predominance of either chamber.
2. Right ventricular predominance is not always associated with any particular type of tuberculosis. It is found more commonly in young than in old patients, and twice as frequently in men as in women.
3. Left ventricular predominance is not always associated with any particular type of tuberculosis. It is found more commonly in older patients, and is twice as frequent in women as in men.
4. Left ventricular predominance occurs more frequently with the increasing age of the patient.
5. In contrast to the necropsy findings reported in the literature, right ventricular predominance is not found more frequently in association with fibroid phthisis, or with pleural adhesions, than with other types of pulmonary tuberculosis.

These conclusions strengthen the opinion that clinical work has led me to form, that it is amazing how the heart adapts itself to the different types of tuberculosis and its complications and maintains a surprisingly good circulation and intake of oxygen, even when the greater part of the lungs are infiltrated with tuberculous deposit.

The capacity of the heart to adapt itself in this way and so maintain the adequate circulation in the lungs, which is of primary importance to recovery, is affected by a variety of circumstances. One of the more interesting is valvular disease of the heart itself. When affections of the valves of the heart are associated with pulmonary tuberculosis, it will be found that in nearly every case the heart trouble has preceded the development of tuberculosis. It is extremely rare for valvular disease of the heart to develop after the onset of tuberculosis. Again, it is of interest to the argument developed below to recall Lawrason Brown's (2) statement, with which I agree, that it is certain that the percentage of patients with valvular disease of the heart who present signs of pulmonary tuberculosis, is smaller than what is found in the general population.

It is agreed that in a considerable proportion of cases of pulmonary stenosis, pulmonary tuberculosis is the cause of death. It would seem, therefore, that a poor circulation through the lungs favors the development of this disease. On the other hand it is agreed that in patients suffering from mitral stenosis pulmonary tuberculosis rarely develops, and that when it occurs the course of the disease is slower than usual. In this connection Tileston (3) states that in 128 fatal cases of mitral stenosis he found a much lower percentage of pulmonary tuberculosis than in other persons of similar environment. Patients with a high degree of stenosis suffered still less often from pulmonary tuberculosis and in no case from active manifestations of the disease. It would seem, therefore, that hyperemia has a protective influence against the development of tuberculosis. In the same way claims have been made by Bier and others of the value of passive congestion in the treatment of tuberculosis. Again, some authorities attribute the results obtained in artificial pneumothorax to the hyperemia produced by the collapse of the lung.

In a considerable number of cases of pulmonary tuberculosis, an x ray examination shows a narrow vertically situated heart (Figs. 2 and 3) to which I think sufficient importance is not attached. An examination by the fluorescent screen shows that, in these cases, the beat is feeble, and that the heart is not functioning well. This narrow appearance of the heart under x ray examination is not due to the rotation, as has been suggested, for the right border is apparently normal in position. The left border appears shrunk; it, in fact, lies so much within the midclavicular line as to uncover the left hilum. Nor

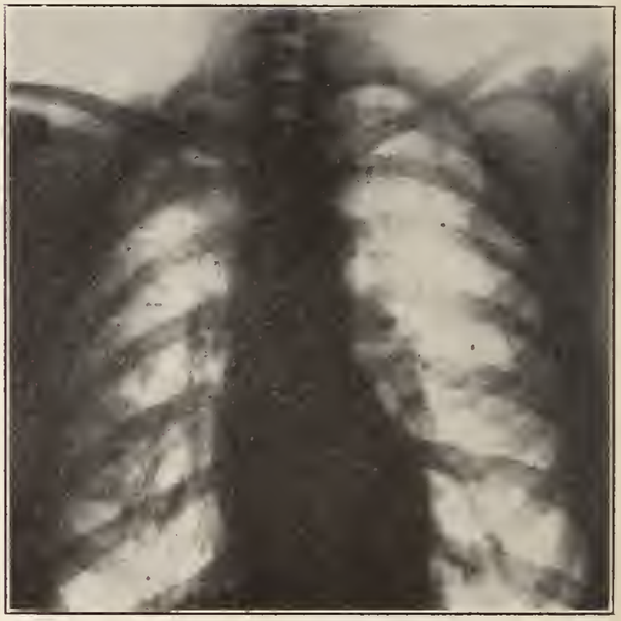

Fig. 2.—C. P. T. Fibrosis of the apex of right lung showing lessened expansion due to contraction.

is this condition associated with general enteroptosis as is the "hanging heart" of Wenckebach. Again, if this condition were in any way due to fixation following adhesions or shrinkage of the lung tissue, we would surely expect the outline to alter from time to time as these conditions became more advanced.

I have been interested for many years in this question of a narrow vertically situated heart, and have often discussed examples of it with my colleague, Dr. Melville, radiologist to the Brompton Hospital for Consumption. Some authorities deny its existence, others dispute its significance. On the other hand, Rokitanski, Albert Weil, Barjon and others have all insisted on the close connection of a small heart with pulmonary tuberculosis. Guarini (4) states that in 1,300 tuberculous patients subjected to radiological examination, he found the small vertical heart in no less than sixty-eight per cent. of cases. Such a high percentage, however, must be unusual. From our experience Dr. Melville and I have come to regard the presence of this type of heart as indicating a poor prognosis, as it fails to do its duty as a normal heart does in the presence of any bacillary infection. Thus in Fig. 1 we have a good heart of normal size and in normal situation which has put up a satisfactory fight, and helped to bring about the satisfactory calcification of tuberculous mediastinal glands. In Figs. 2 and 3 we have examples of the small vertical heart, and in both these cases the fight has been poor.

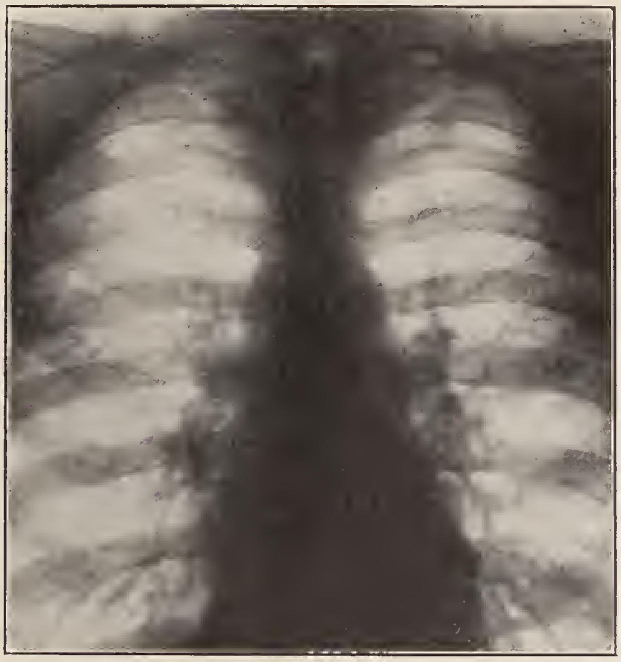

Fig. 3.—Hilum tuberculosis, bilateral, showing characteristic appearances at the hila, with lessened expansion at apices.

Whether this type of heart is a true dystrophy, I do not know. It approaches the size normal at puberty and is held by some to be due to arrested development. It may be that both it, and the accompanying type of thorax, are due to the absorption of toxin from some focus in the glands which is not sufficiently virulent. It may be for years, to give rise to the development of pulmonary tuberculosis. In my experience, in a case of doubt as to the diagnosis of tuberculosis, the presence of this type of heart would be a deciding factor in my recommendations with regard to treatment. Again, its presence in a definite example of pulmonary tuberculosis makes me take an unfavorable view of the prognosis.

I am confirmed in these views by the work of Woods Hutchison (5). He holds that all classes of animals with a relatively small heart in proportion to their body weight, are very susceptible to tuberculosis, while others with proportionately larger hearts are almost immune.

The general conclusion that I have formed is that the state of the heart and circulation is of primary importance not only in regard to the course taken by a case of pulmonary tuberculosis, but also in regard to the development of this disease. As to the latter, we know that practically everyone is infected with the tubercle bacillus, but we do not know why some eighty to ninety per cent. of us never show active symptoms of tuberculosis. Something happens which enables the tubercle bacillus, hitherto controlled by the defensive forces of the body, to flourish and cause disease. What that something is, we do not know, any more than we know what it is that makes an individual suddenly become sensitive to some foreign protein and so develop asthma. Why did the tuberculosis death rate in Berlin double between 1913 and 1918? Why were 40,000 British soldiers discharged during the late war with a diagnosis of pulmonary tuberculosis? In these cases we are not, assuredly, dealing with increased exposure to infection, but with conditions of strain on the vitality in general and the circulation in particular. Again, why is relapse in cases of pulmonary tuberculosis associated in an overwhelming proportion of cases with overexertion in one shape or another?

The probability is that there is some chemical change which produces conditions favorable to the growth of the tubercle bacillus, on parallel lines to what occurs in the case of gas gangrene. It has been pointed out by Wright (6) that the bacillus of Welch which grows only after a large implantation and with a certain difficulty in the normal alkaline and antitryptic blood will grow from the smallest implantation and with extraordinary rapidity in blood in which either the antitryptic power or the alkalinity has been blunted off. And again it was pointed out that the well known biological characteristics of the microbe—its impotence when injected intravenously into a living animal, and its power of producing a fulminating septicemic infection if the injected animal be immediately killed and kept warm—are explained by the fact that the postmortem neutralization of the alkali of the blood by lactic acid derived from the muscles provides conditions which are eminently favorable to the pullulation of the bacillus.

The clinical facts elicited in the war are in absolute accord with these laboratory observations. The most noteworthy of those clinical facts are as follows:

a. Gas gangrene is particularly prone to develop in the wounded who, exhausted by muscular exertion and exposure to cold, lapse into a condition of shock.

b. It is particularly prone to develop in a limb when its circulation has been arrested by the application of a tourniquet.

c. It is particularly prone to develop in connection with wounds involving the posterior tibial artery—such wounds cutting off practically the entire blood-supply to the muscles of the calf.

d. It is also prone to occur when we have a large lacerated wound or extensive bruising of muscular tissues—in other words, conditions which interrupt the blood supply to extensive tracts of muscle.

e. The infection generally develops in, and often remains for a considerable time limited to, muscle.

It will be seen that what has just preceded can be summarized by saying: 1. That gas gangrene infection will generally begin in, and for a time remain confined to, that particular variety of tissue (muscle) which will by its normal and abnormal metabolites—carbonic acid or, as the case may be, lactic acid—blunt off the alkaline reaction, which is unfavorable to the growth of the bacillus. 2. That gas gangrene infection will be prone to supervene, a, where we have, as a result of violent muscular exertion, and subsequent fall of the blood pressure, a condition of general muscular acidosis, and, b, where we have, as the result of either local mechanical compression, or trauma of a major artery, or laceration involving disorganization of the blood supply to muscle, a regional muscular acidosis.

It is probable, according to this reasoning, that the development of pulmonary tuberculosis depends on some chemical factor and that this factor in turn depends at any rate in part upon the condition of the heart and circulation.

REFERENCES.

1. Boas and Mann: *Archives of Internal Medicine*, p. 62, July 15, 1921.

2. Brown, Lawrason: *American Journal of the Medical Sciences*, New Series, vol. cxxxvii, 1909, p. 162.

3. Tileston: *Journal A. M. A.*, 1908, 1, 1179.

4. Guarini: *La Riforma Medica*, June 22, 1918.

5. Hutchinson, Woods: *Medical Record*, 1906, 340.

6. Wright: *Technic of the Teat and Capillary Glass Tube*. Second edition, 1921.

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Paroxysmal Tachycardia

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The introduction of the clinical polygraph and the electrocardiograph in the examination of the heart has thrown a flood of light upon the condition called paroxysmal tachycardia. I employ this term to denote a condition, not uncommon, in which a marked acceleration of the cardiac rate occurs, which commences suddenly and abruptly and without apparent cause, lasts for a varying period, ceases suddenly and abruptly, and is due to an abnormal rhythm—the stimulus for cardiac contraction, instead of arising at the junction of the great veins with the auricle, having its origin at an abnormal point. The return of the cardiac rate to what it was prior to the paroxysm is due to the reversion of the cardiac rhythm to the normal. From the definition given it will be seen that paroxysmal tachycardia does not include acceleration of the cardiac rate associated with the normal or sinus rhythm.

It should be noted that the nature of the abnormal cardiac rhythm is not always the same; in other words, the condition which gives rise to the paroxysmal tachycardia varies. The point of origin of the new rhythm is usually situated in the auricle, and the ventricle responds to impulses received from that chamber; but it may rarely arise in the ventricle, and in this case the auricle responds to impulses received from the ventricle. When the former is the case, the two commonest causes are temporary auricular flutter (Figs. 1 and 3) and auricular fibrillation (Fig. 4), but there may occasionally be other causes (Fig. 5).

The paroxysm of tachycardia may last only for a few beats or may persist even for months; as a rule, it lasts for some hours, and only exceptionally does it continue for several weeks, and rarely for months. The patient may experience one attack and never have another, or he may be subjected to many in the course of twenty-four hours, or the attacks may occur at varying intervals, frequent or long, for many years. Permanent auricular fibrillation or flutter may supervene.

ETIOLOGY.

The etiology of paroxysmal tachycardia is obscure. It may occur at any age after five, but usually first occurs during middle life. It appears to be more common in males, and this certainly agrees with my experience. A history of previous infection by rheumatism is not uncommon and a fair proportion of cases are the subjects of valvular disease, particularly of mitral stenosis, or of myocardial degeneration, but no evidence of organic disease of the heart is found in a considerable proportion of cases. The condition has been noted in association with alimentary toxemia, in reflex irritation, neurasthenia, and other morbid states. Among exciting causes are physical exertion (Figs. 2 and 3), emotional excitement, digestive disturbances—particularly flatulant distention of the stomach or colon and in one of my own cases the adoption of a certain posture appeared to bring on the attacks.

SYMPTOMS.

In some cases there is limitation of the field of cardiac response between the attacks, such as dyspnea and precordial distress on exertion. Other cases are absolutely free from subjective symptoms in the intervals, but in many cases auricular or ventricular extrasystoles are to be observed.

It has been already noted that there is a sudden, abrupt, and great acceleration of the cardiac rate, coming on without apparent cause, while at the end of the paroxysm there is a sudden and abrupt return to the rate and cardiac rhythm which preceded the attack. In some cases the patient is able to recognize the onset and termination of the tachycardia, if the attack be brief; but, if it persist for any time, he usually becomes conscious of it, and generally complains of a fluttering sensation in the chest, this sensation being unlike that of palpitation. The patient may also experience a sensation of pulsation in the neck. His face is usually pale, and has an anxious expression. The cardiac rate is usually above 140 a minute and may reach even 300; in a majority of the paroxysms it is between 150 and 190; it should be counted at the apex, either by palpation or auscultation, unless it is extremely rapid, when graphic methods are necessary. The pulse is of smaller volume than normal and its character may resemble that of the pulsus celer. It may be quite regular, or very irregular when the condition is due to auricular flutter in which the response of the ventricle to auricular contraction is at irregular intervals, or completely irregular when the result of auricular fibrillation. A noteworthy feature is the frequent presence of pulsus alternans, but this can only very rarely be made out by the finger. The blood pressure is generally lower during the attack. The area and force of the apex beat may be increased. The jugular veins may be distended and may show very rapid pulsation.

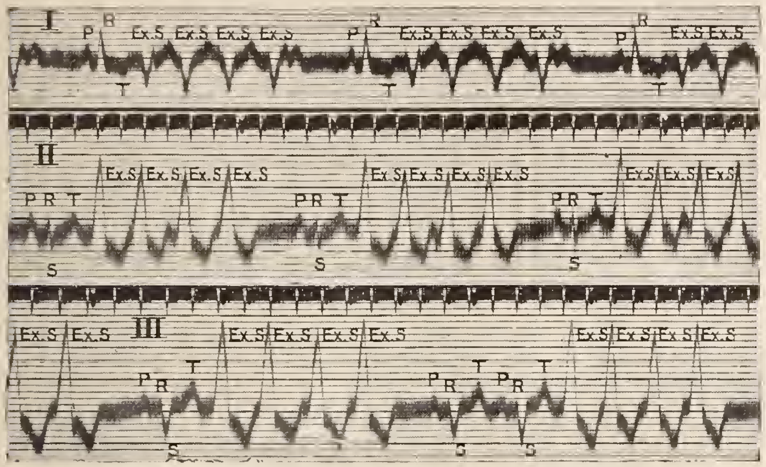

Fig. 1.—Electrocardiogram from a case of auricular flutter.

During the attack the common indications of cardiac failure may be present, their severity depending upon the cardiac rate, the duration of the paroxysm, and the integrity of the myocardium. In some cases, even when the paroxysm lasts for a day or two, there may be only some limitation of the field of cardiac response, with little, if any, cardiac dilatation, hepatic enlargement, or dropsy; while, in long continued paroxysms, and even in some cases in which the paroxysms last for only a few hours, cardiac failure may be extreme. There may be dyspnea on exertion, a feeling of discomfort, oppression, or actual pain in the chest, lassitude, weakness, or exhaustion; pallor of the skin, with undue prominence of the superficial veins, cold perspiration, an anxious expression of the face, and symptoms of cerebral anemia—such as giddiness and faintness; flatulence, nausea, and vomiting may also be present. Later on cyanosis, cough and expectoration, and even hemoptysis, and signs of edema at the bases of the lungs may be present.

The area of cardiac impairment may become considerably enlarged — even within a few hours, the first sound of the heart shortened, sharp, high, and clear in pitch, the long pause is often shortened, while the rhythm of the sounds sometimes resembles that of a fetal heart, and if murmurs were previously present they alter in character or even disappear. There may be tenderness of the precordium and hepatic area, the liver may be palpable and pulsating, ascites and general anasarca occur, and the urine become scanty, high colored, and albuminous.

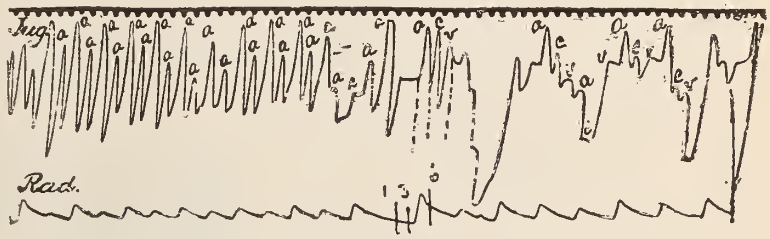

Fig. 2.—A simultaneous tracing of jugular and radial pulses showing temporary auricular flutter from physical exertion.

Analysis of the polygraphic tracings gives different results according to the site from which stimuli for contraction arise, and the electrocardiograms present different features according to the point of origin and path of conduction of the stimuli for contraction. In all probability they will show auricular flutter (Figs. 1 and 3) or auricular fibrillation (Fig. 4) as the cause of the attack; but, as already noted, there may occasionally be other causes (Figs. 5 and 6).

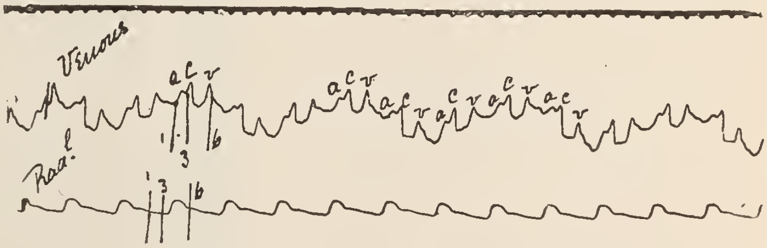

Fig. 3.—A simultaneous tracing of the jugular and radial pulses showing temporary auricular flutter.

A remarkable and characteristic feature of the condition is that with the sudden reversion of the rhythm to the normal there is an extraordinarily rapid recovery to the state in which the patient was prior to the paroxysm; within a few hours, there may, indeed, be no evidence whatever of cyanosis, distention of the veins, cardiac dilatation, enlargement of the liver, or conditions of a similar nature.

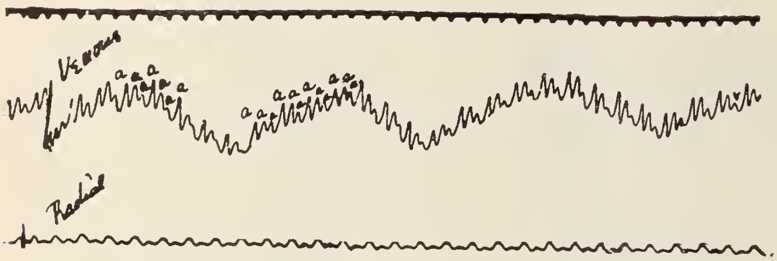

FIG. 4.—A tracing from the jugular and radial pulses showing auricular fibrillation.

In some cases the cessation of the attack is accompanied by the passage of large quantities of wind, and excessive eructations, while a large quantity of urine may be voided. Death during the attack is not common.

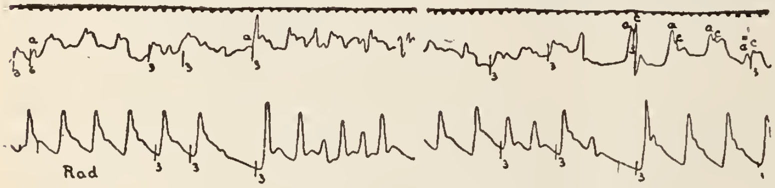

FIG. 5.—Simultaneous tracings of jugular and radial pulses showing auricular fibrillation.

DIAGNOSIS.

The diagnosis of paroxysmal tachycardia is usually not difficult. The most important points from the diagnostic point of view are: 1. The commencement and termination of the attack of tachycardia. The suddenness and abruptness of the onset and termination of the tachycardia is a characteristic feature—the maximum rate is attained within a few seconds, and the return of the cardiac rate to what it was prior to the attack takes place equally quickly, whereas in tachycardia associated with the normal rhythm the onset and termination are gradual. 2. The cardiac rate. A persistent rate of over 160 is almost invariably due to an abnormal rhythm, and a persistent rate of over 140 may be due to the same cause. 3. The cardiac rate is not influenced by change of posture or other forms of physical exertion, as in the case in tachycardia not associated with an abnormal rhythm. Polygraphic or electrocardiographic examination will put the diagnosis of paroxysmal tachycardia beyond all doubt.

PROGNOSIS

The difficulty of forming a prognosis in any case of paroxysmal tachycardia is great. The prognosis may be considered from two viewpoints: 1, that of a particular paroxysm, and, 2, the question of recurrence of the attacks. With regard to the former it may be noted that death during an attack is comparatively infrequent, although this may occur when the duration of the attack is prolonged. The points which should be taken into account in considering the prognosis in an individual attack are the ventricular rate, the duration of the attack, and the degree of cardiac failure present. When the ventricular rate is not very high, and there is little or no cardiac dilatation, and an absence of edema of the lungs, hepatic enlargement and anasarca, the outlook is good as far as the risk of life is concerned; while, on the other hand, if the clinical picture be the reverse, the outlook is uncertain, although it should be remembered that the paroxysm may cease at any time and there is no means of knowing when this may occur, and the patient improves with extraordinary rapidity.

With regard to the question of the recurrence of the attacks, it is impossible to give an answer. For in some cases the patient may never suffer from a second attack; while, on the other hand, they may recur even several times in the course of twenty-four hours, or at frequent intervals for many years, or, lastly, permanent auricular flutter or fibrillation may supervene even after a few attacks. An attempt should be made to estimate the degree of integrity of the myocardium between the attacks, and the best way to ascertain this is to find out how the heart responds to effort. If the field of cardiac response is not diminished, and the attacks be infrequent and transitory with an absence or only a slight degree of cardiac failure during the paroxysm, the prognosis may be considered good.

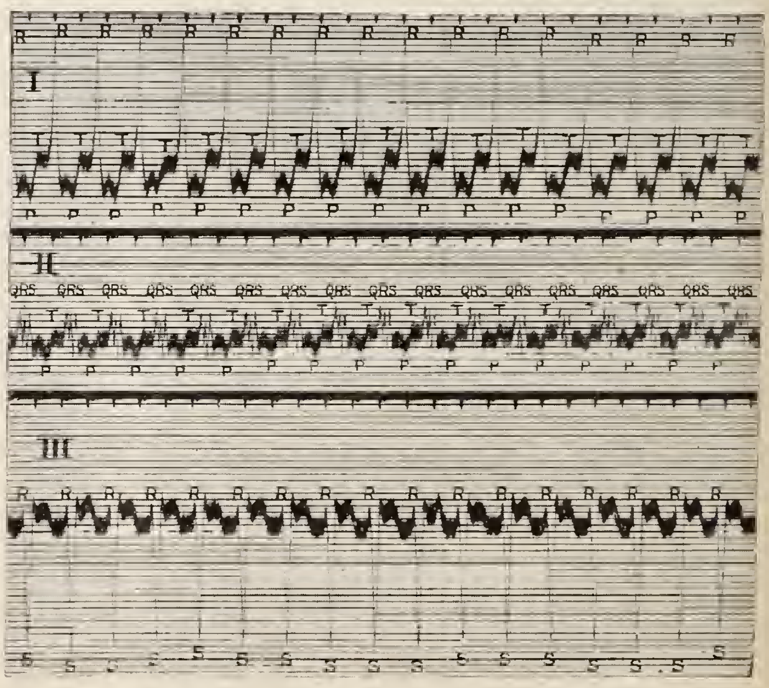

FIG. 6.—Electrocardiograms from a case of auricular fibrillation.

TREATMENT.

The results of treatment of this disorder, in the great majority of cases, are very unsatisfactory. It is true that paroyxsm not infrequently ceases when various remedies are applied; thus, bringing up of wind, the act of vomiting, the adoption of a certain posture, pressure on the vagus—particularly the right, friction of the chest wall, and local applications in the form of an ice bag, mustard leaves, or warmth to the precordium, may be followed by relief. But it should be remembered that the nature of the disorder is to stop suddenly, and, therefore, the question of *post hoc* and *propter hoc* always arises. As far as my observations have gone, the remedy which offers most encouragement is strophanthin injected intravenously. One dose of one hundredth of a grain, or two or three doses of one two hundredth and fiftieth of a grain, every two hours, may be administered. Failing this, digitalis should be given by the mouth and pushed to the full physiological reaction. If there be indications of heart failure, such as dyspnea, cyanosis, or dropsy, these should be treated on general lines.

Between the attacks, the general condition, and whatever appears to be the exciting cause of the paroxysms, should receive attention. Any gastrointestinal disorder should always be corrected. Bromides may be tried. In two cases—and in two only—in my experience, the continuous administration of digitalis proved effective.

Infective Endocarditis

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Endocarditis, as its name implies, may be taken to indicate each and any of the varieties of inflammation which the heart's lining membrane may suffer. That the process as such arises in every case as the result of infection cannot be doubted for one moment and with equal confidence may it be asserted that the lesions so produced are not determined by any one particular microorganism; it may be inferred moreover that, as a general rule, the intensity and gravity of the endocarditis depends more upon the degree of resistance possessed by the patient, also the virulence of the organism concerned upon than the actual type of germ responsible for the infection.

In certain rare instances endocarditis must be assumed to be primary, but by far the larger number of cases arise secondarily as the direct result of some definite intercurrent malady; in either case the infective process, having secured a foothold on the endocardium, will give rise to tissue changes on the severity of which the clinical course of the case will depend. For this reason we must be prepared to recognize acute, subacute, and recrudescent types of cases, in each of which an actively infective lesion is progressing, and to differentiate as distinctly as possible these socalled active cases from those in which the lesion may be regarded as having assumed the quiescent stage.

In the present context infective, or rather active, endocarditis will be considered, as opposed to that variety of the disease in which infectivity is no longer discernible.

Any inquiry into the subjective phenomena which characterize the onset of endocarditis will of necessity entail a consideration of the features observed during the course of the rheumatic group of infections, undoubtedly the most prominent of the etiological factors responsible for damage to the cardiac structure. It is therefore to acute rheumatism that we can best direct our attention in any endeavor to elicit manifestations indicative of the early stages which characterize the heart's involvement in the infection.

The acknowledged association between rheumatic infections in childhood and heart disease in later life is bound to render our observations in the first mentioned conditions the more critical, for one realizes the supreme importance of early diagnosis and prophylaxis in these diseases perhaps more forcibly than in any other, and all experience goes to prove that no successful crusade can be waged against heart disease until the depredations of the rheumatic virus have been effectually engaged and subdued.

Apart from certain cases in which the endocarditis happens to be latent, one can usually determine suspicious features when the course of a patient in the throes of acute rheumatism is carefully watched; some degree of précordial pain or distress, an undue tendency to dyspnea, sweats, or pyrexia, with the possible addition of palpitation, the presence of cardiac overaction, irregularities, alterations in the heart sounds, the appearance of murmurs, or evidence of delay in the passage of the stimulus through the junctional tissues—all of these indications alone, and more especially if combined, may be judged to indicate the onset of a definite infection and invasion of the heart by the underlying morbid process.

Often however the onset of endocarditis is far more insidious, possibly only an ill defined general debility during the few weeks or months previous to observation.

In most of these cases some special feature, i. e., excessive sweating, diarrhea, headache, unexplained hemorrhage, or arthritic pains, by reason of their persistence, will force the patient to seek advice, the continuation of the symptoms, rather than their degree, being the deciding factor from the patient's point of view. In other instances the origin of the disability is more definite in that implications with some previous disease are established; this latter may have been in itself seemingly trivial, such as influenza, tonsillitis, rheumatism, or a mild attack of gonorrhea; on the other hand, a grave malady may be in the background, e. g., puerperal fever, erysipelas, pneumonia, or some one of the many diseases secondary to the existence of a septic focus, suppurating wounds, abscesses, or other causes.

The more commonly noted symptoms include prostration, general malaise, headache, chills, sweats, pyrexia, anorexia, diarrhea, vomiting, pains in the limbs and joints, hematuria, etc., and one would be inclined to pay special attention to any such arising in patients known to be the subjects of heart lesions previously regarded as quiescent, or to any sudden and radical aggravation of their existing symptoms and physical state, mainly by reason of the fact that clinical experience all goes to prove that the healed focus of past infection will invariably offer favorable scope for the ravages of germs which may later be introduced into the circulatory system.

There remains, however, one variety of endocarditis which differs materially from those mentioned above by reason of the acuteness of its onset and the severity of its initial symptoms; the clinical picture is one of profound constitutional disease and may assume all the objective signs and proportions which, in practice, we associate with the development of one of three definite diseases, typhoid fever, meningitis, or acute miliary tuberculosis. The diagnosis in these cases is one of considerable difficulty, and the more baffling owing to the fact that focal evidence of cardiac mischief may not be ascertainable during life, and in spite of the value attaching to blood culture, agglutination tests, and leucocyte counts.

Broadly surveyed the modes of onset of endocarditis present appearances of so widely differing a character, that, quite apart from bacteriological evidence later to be discussed, one would not be inclined to regard endocarditis as a specific disease, but rather to suspect the action of a variety of organisms, and to attribute to these latter a virulence the reverse of constant. All the evidence both clinical and experimental, goes to prove that such is the case. One has but to consider the fulminating character of an endocarditis activated by the pyococci from some septic focus, also its usually rapid fatal termination, and compare it with the endocarditis of rheumatism, an equally infective process, but one moreover which varies in degree from case to case, and fortunately tends to lose its infecting power and become definitely quiescent.

It would seem, therefore, that we possess sufficient evidence to warrant a division of infective endocarditis into groups, and this purely from the clinical viewpoint. First we may distinguish the endocarditis of acute and subacute rheumatism (peculiar in so far that it accounts for the majority of quiescent valvular lesions; secondly, the group in which endocarditis is simply a factor in the process of an acute pyemia, the latter originating in some primary focus whether it may be the uterus, the lung, the bones, the skin, or from other quarters, and, thirdly, the endocarditis secondary to the reinfection of a quiescent lesion.

As might very reasonably be imagined the etiology of endocarditis is intimately bound up with the question of predisposing influences. We note, for instance, the recurring sore throats and tonsillitis which prelude the onset of acute rheumatism, the unhealthy gums and the septic sinuses, and equally do we view with suspicion those patients debilitated and anemic by reason of some recent illness, the intemperate, the cachectic, the subjects of congenital cardiac malformation, and all those who have suffered previous attacks of endocarditis.

PHYSICAL SIGNS.

Inspection.—Carefully carried out and with a good light, much valuable information may be forthcoming as the result of simple inspection.

One notes the aspect of severe illness, the drawn features and anxious expression, the prostration, and varying degree of objective debility which replaces normal vitality and healthy elasticity, and the pallid appearance suggestive in the majority of cases of advanced secondary anemia, heightened more often than not by cyanosis of the lips and mucous membranes. Particularly striking is the degree of pallor which usually obtains; more especially is this noted in the severe types of the lesion, the complexion in these instances varying from dead white to lemon yellow, or the *café-au-lait* tint suggestive of jaundice.

Careful observation should be made in every case for the possible presence of petechial hemorrhages in the skin or mucous membranes, likewise the cutaneous lesions in the shape of papular rashes or irregular areas of ecchymosis. The petechiæ as a rule arise in crops and, although their distribution is by no means constant, they can best be searched for in the loose tissues at the base of the neck, the infraclavicular regions, the axillæ, and the ocular and buccal mucous membranes; in detail they may be described as small circular or linear patches, vivid red in color if recent, brown and yellowish in appearance if the lesions be of older standing; quite often, as was pointed out by Libman, the petechiæ, by reason of a pallid central zone, assume a ring shaped appearance; in every case pressure fails to obliterate the hemorrhages.

Two other important signs will be revealed by inspection— viz.: clubbing of the fingers and erythematous nodes which appear on the terminal phalanges of the feet and hands.

The former, more especially in subacute cases, must always be viewed with suspicion and, when conjoined in a case of valvular disease, with other phenomena such as pallor, splenic enlargement, or arterial embolism, may be taken to indicate decisively the presence of active infection (Lewis); the latter —viz.: the erythematous nodes, consist of patches of discoloration whose typical seat is the soft tissues at the extremities of the fingers or toes, and which during their earlier phases will be the focus of painful sensations and exquisite tenderness; these the patient will eloquently describe, likening the pain to that of a pinprick, a burn, or to the presence of something which is forcing the nail from its bed.

In many cases, particularly the more rapidly progressive types, enlargement of the spleen is recognized and pain over the organ, secondary to perisplenitis or infarction, is a frequent event; certain special characteristics of the splenic tissue seem noteworthy in this context; the peculiar nature of the capillary bloodvessels which are so developed that they form wide spaces for the accommodation of a large amount of blood; also the retarded circulatory stream, and leucocyte stagnation which is doubtless responsible in some measure for the deposit in the spleen of organisms and foreign substances circulating in the blood.

Turning now to a consideration of the signs which, apart from certain latent cases, the heart itself evinces, it must be at once agreed that anything approaching uniformity is not under any circumstances observed.

Quite early in the progress of an initial attack of endocarditis certain trustworthy evidence may be forthcoming; a persistent tendency to overaction, even at rest, with slowly increasing enlargement of the heart, alterations of rhythm, precordial hyperalgesia, and the possible development of a murmur indicative of valvular damage. Much caution must be exercised, however, in the interpretation of the significance attaching to the appearance of a murmur, more especially if this latter be systolic in time; and it is well to remember that certain cases of endocarditis may run their entire course without a murmur becoming audible at any time. The majority, however, will present some form of heart sound change, either a reduplication of the first or second sound, or a blurring of one or other sound, or a definite murmur. The latter must be watched with care and its area of propagation noted from day to day in order to appreciate possible changes in its quality or distribution, and anything in the shape of added elements. It is a notorious fact, and one that is easily understood, that actively spreading infection is associated with murmurs which change in quality from time to time, and upon which further murmurs are not infrequently superimposed.

Undoubtedly the simplest form, from the diagnostic point of view, occurs in the past victims of endocarditis whose subsequent valvular disease becomes the focus later of fresh infection. Here we shall invariably find characteristic murmurs, and in association with the well marked constitutional disturbance the change in these sounds, which frequently develops, materially aids our conclusions. During the years 1916-1920 twenty-nine such cases were admitted to the wards of St. Thomas's Hospital. In all these patients definite evidence of valvular disease was present on admission; the average age was thirty-five years, the oldest being fifty-four, the youngest thirteen years; seventeen were males, twelve were females; the past history included rheumatism in nineteen cases, pneumonia, erysipelas, gassing, influenza, dysentery, malaria, in the remaining ten cases being noted in the past history. Twenty-five patients died in hospital, one patient was discharged at her own request and died later in her own home; two patients recovered, one being a male patient aged thirty-five suffering from aortic and mitral disease secondary to rheumatic fever at the age of eight, from whose blood a gram positive streptococcus was isolated, and who was successfully treated with an autogenous vaccine, the other being a male patient aged twenty-two suffering from aortic disease with evidence of failure, embolic phenomena, etc., whose blood culture was repeatedly negative.

The temperature, which as a rule is raised, follows an extremely variable course; in certain cases high and sustained, in others irregular and intermittent; the more protracted cases of subacute infection are not usually attended by conspicuous elevations of temperature, remissions are frequent, and apyrexial intervals common.

The pulse rate fluctuates widely following the swing of the temperature, the tension is reduced, dicrotism may be observed, also the occasional appearance of irregularities in rhythm.

Profuse sudation occurs following the febrile periods, and rigors are likely to characterize the more acute and virulent infections. Embolic processes frequently come about and characteristic local effects result; sudden pain in the lumbar region combined with rigors and hematuria are evidences of renal embolism; pain to the left hypochondrium followed by splenic enlargement will denote embolism of the spleen. Other gross embolic phenomena include the cerebral, so often the cause of the fatal issue in active endocarditis, the mesenteric, responsible for acute and persisting abdominal pain and hemorrhages, and the obstruction of some one or other of the important vessels supplying the limbs. In addition it is perhaps scarcely necessary to mention that the petechial hemorrhages, cutaneous nodes, rashes, etc., which so frequently develop during the disease, are embolic in origin.

The course of the disease can be gauged approximately by the intensity of the symptoms, and the presence or otherwise of complicating factors; of the latter mention may be made of those likely to portend fatal results, viz., septic bronchopneumonia, pulmonary or other abscesses, cerebral embolism, meningitis, and cardiac failure. In a large proportion of the cases of endocarditis, notably those developing in association with rheumatic fever, the tendency is undoubtedly for the infection to become quiescent, others, the more fulminant type, evince constitutional symptoms of varying severity, and signs of general infection which prejudice the issue, hinder recovery, and hasten the termination of the malady.

Death usually occurs from uremia, cerebral embolism, pneumonia, or acute general infection; in certain rare instances cardiac failure develops, and the case terminates in characteristic fashion with all the usual features of myocardial incompetence.

DIAGNOSIS.

To be able to recognize the presence of active endocarditis is frequently a matter of extreme difficulty, as must be apparent from the statements already made in considering the symptoms of the disease. It is scarcely necessary to reiterate what has been said in regard to the physical signs produced by acute endocarditis, the cardiac enlargement and overaction, the alterations in heart sounds, the fast and compressible pulse, the tendency to syncopal attacks, and the continued fever. Further it must be pointed out that the clinical picture may strikingly resemble that of certain other diseases, viz., septicemia, enteric fever, acute miliary tuberculosis and meningitis. With regard to septicemia much uncertainty will invariably exist, and, realizing that endocarditis may be but an incident in the general septicemic process, we must endeavor to solve the problem of whether or not the septic infection is accompanied by endocardial changes. In both instances there are constitutional symptoms severe in degree, alterations of pulse, and temperature, cutaneous manifestations, etc., so that a critical investigation of the heart will be invariably called for.

Certain cases of acute endocarditis simulate enteric fever to a remarkable degree, presenting all the well known features of the last mentioned disease, the sweats, prostration, gastroenteritis, and other characteristic abdominal signs, the purpuric rash, and severe general asthenia, but one is able in practice to rely upon certain differences which obtain, as a rule, between the two diseases. Careful observation of the pulse and temperature chart from day to day may be sufficient to settle the question, for one cannot fail to be struck by the persistently slow pulse rate, and the sustained range of temperature which stamp the early stages of enteric fever, and how materially the course of endocarditis differs in these respects. Additional assistance in diagnosis may be obtained from a blood culture, also the presence or absence of a positive Widal reaction; lastly mention must be made of the leucocytosis, so frequently observed in endocarditis, and the leucopenia which as a rule characterizes uncomplicated enteric fever.

Acute miliary tuberculosis is less likely to cause difficulty, since the fluctuations of pulse and temperature and the excessive nocturnal perspirations are more regular in their occurrence, while the wasting is considerably more rapid.

Often, moreover, focal lesions will be defined in the lungs, brain, or abdomen, and the cardiac examination is entirely negative. In certain instances the initial phases of endocarditis bear strong resemblance to those characteristic of acute meningitis owing to the early embolic implication of the central nervous system, and these cases are likely to occasion considerable discussion unless definite physical signs pointing to cardiac disease are noted to coexist.

In concluding our references to the subject of diagnosis it may not be inopportune again to emphasize the important objective signs which can be taken to indicate progressive endocardial infection, viz., pyrexia, splenic enlargement, pallor, clubbing of the fingers, and embolic phenomena. Associated with evident heart mischief these signs, alone or in combination, will enable us to appreciate the nature and possible extent of the lesion, also the complications which may reasonably be expected, and taken together will prove unquestionably valuable when we attempt to frame a scheme of prognosis.

BACTERIOLOGY AND MORBID ANATOMY.

It is almost certain that active endocarditis is associated with bacterial infection; for this fact we are indebted to a host of observers, notably Poynton and Payne, Horder, Lewis, Libman, and the late Sir William Osler. The rheumatic group of diseases comprises the most frequent causes of the malady, and it is particularly noteworthy that the endocardium damaged initially during acute rheumatism will be the more prone to be victimized by fresh infection at a later date, possibly after passing through a well defined quiescent interval. Microorganisms have been isolated from the blood stream and discovered in every form of acute endocardial vegetation.

Pyogenic organisms, both with and without hemolytic properties, are the most common, the infection originating in some septic focus, for instance, a wound, the uterus in puerperal fever, a peritonsillar abscess, erysipelas, or from other sources, in other instances depending upon complications arising during the progress of some well recognized primary disease, scarlet fever, measles, smallpox, influenza, and other diseases, and very frequently without obvious or ascertainable cause. Other organisms, notably the pneumococcus, the gonococcus, Pfeiffer's influenza bacillus, the bacillus coli, are, from time to time, cultivated from the blood stream.

(A positive blood culture was recorded in ten of the St. Thomas cases, a streptococcus in six, a staphylococcus in three, and the pneumococcus in one case.)

The postmortem appearances enable us to draw certain deductions:

1. That the valvular endocardium is more likely to be the seat of the disease than any other part of the membrane.

2. That in an overwhelming majority of cases the lesions affect the left side of the heart. (In the St. Thomas series two cases of tricuspid disease were noted.)

3. That in valvular endocarditis the surface of the valve exposed to the blood stream is first affected; hence the earliest evidence of the process is found on the auricular aspect of the mitral and tricuspid, on the ventricular aspect of the semilunar valves.

An infinite variety of lesions is presented to the naked eye for examination. The fresh vegetations, consisting of elements derived from the blood, are composed of leucocytes, fibrin, and blood platelets, with as a rule some form of microorganism permeating the interstices and surface of the lesion; pale pink or greenish in color these recent vegetations are, as a rule, soft, friable and easily detached. The necrotic tendency, moreover, which the actively spreading areas of disease assume, may, in certain instances, be so severe that definite loss of tissue, perforations of valves or septum, and extensive deformity will indicate the virulence of the ulcerating process.

Beneath the proliferating vegetations one not infrequently finds evidence of organization and fibrotic changes in which the fixed cells of the subendothelial layer plays a prominent rôle, so that divergent pathological processes may coexist, repair and necrosis being observed in different regions of the same lesion; certain specimens will show these latter changes to great advantage; especially is this noticed if a fresh injection has lighted upon a lesion hitherto healed and quiescent. Under such circumstances one will notice the fresh vegetative formations, their soft friable consistence, their pinkish color, also the irregular edge of the fungating process, the formation of ragged ulcers of valves or endocardium, the possible extension to and rupture of chordæ tendineæ, valve cusps, etc., in conjunction with processes evidently of older standing as judged by their firm, often calcareous, constitution, the fibrosis in their immediate vicinity, and their freedom from organisms, some variety of the latter as a rule abounding both in and upon the recent excrescences.

TREATMENT.

The prophylactic aspects of the treatment are of the greatest importance. This is especially true in respect of patients who may be passing through an attack of acute rheumatism, and extreme caution must at all times be displayed during the closing stages and early convalescence from this disease. The onset of endocardial infection may be perfectly latent; on the other hand, suspicious changes may be noted which enable a correct appreciation of the underlying mischief; in these cases one must enjoin absolute rest in its strictest possible form, together with all the skill and attention that modern nursing can command. Some member of the salicyl series of drugs should be prescribed and persevered with until improvement is well established, when the dose of the drug should be slowly reduced; certain observers report satisfactorily upon the exhibition of potassium iodide in short courses, and local treatment by means of small fly blisters to the precordium; in other respects, and apart from certain specific measures, the treatment must be largely upon symptomatic lines, i. e., to oppose any tendency to insomnia, to relieve pain, digestive errors, or other disorders.

For the precordial pain the application of light poultices or hot fomentations locally will be of great value, and, in certain instances, an icebag; persistent pyrexia will as a rule respond to the salicylate medication, to quinine, or tepid sponging. Rapidly acting stimulants as ether, ammonia, or alcohol, will usually tide the patient over periods of exhaustion but definite myocardial weakness will demand stronger remedies, strychnine or caffeine subcutaneously, or an intravenous injection of strophanthin, with inhalations of oxygen as often as thely may seem to be required.

In conclusion, reference may be made to the adoption of certain specific remedies which the septicemic nature of the disease will obviously indicate. In this category one must consider the use of vaccines and antisera. An autogenous preparation of the former should be administered where possible, the doses being scrutinized with extreme care, and regulated according to the severity of the symptoms, with due regard to the possible appearance of complications reactionary in character. An appropriate antiserum, or in the event of a negative blood culture, a polyvalent serum may be given a trial on tentative lines; recoveries have been recorded, but the success of this line of treatment (antiserum and vaccine therapy) cannot be said even to approach the results which in practice it should theoretically assure.

Lastly, one may allude to the question of chemiotherapy, including under this heading the administration orally, subcutaneously, or intravenously, of some suitable member of the mineral germicides; several have been suggested and tested experimentally, viz., ensol, corrosive sublimate, colloidal solutions of platinum and silver, Dakin's hypochlorite solution, and others. The results so far obtained are decidedly unsatisfactory, temporary improvement may be secured, but relapses are frequent, and, in the opinion of most competent observers, this particular line of treatment must be acknowledged to possess little or no curative value of anything approaching a definitely permanent nature.

The Relationship of Precordial Distress to Extracardiac Conditions*

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The question of the relationship of the heart to some of the conditions of the human body in disease has always been an interesting one. The relationship is so intimate and vital that it is but perfectly natural that close attention should be given to it whenever there is present within the body a serious disease; or whenever there are abnormal precordial sensations. The laity as well as the doctor has long considered the importance of the heart and its integrity whenever serious disease is present.

The ancient physician for years studied the pulse carefully and considered it a true index of what the heart was doing and based his prognosis to a great extent upon its condition. Later on an instrument of precision, the stethoscope, was added to the armamentarium, and opinions were given based upon the information obtained by this important aid in the study of heart sounds and adventitious sounds heard over the precordium. Then later other instruments were perfected to record blood pressure and its changes together with other instruments devoted to the study of the rhythm of the heart. All of these naturally stimulated the physician with renewed interest in the study of the heart and circulation. These studies have been valuable and have shown us the error of some of the previous methods of interpretation.

It is logical, therefore, if the physician is studying so vital an organ, that those most concerned, the laity, should also consider its integrity of extreme importance. Throughout this period of development of more exact instruments for diagnosis the laity kept pace in its imperfect way and received certain impressions which have become firmly fixed in its mind.

Not many years ago the question of the ability of a patient to take an anesthetic was considered entirely from the question of the condition of the heart. Another time honored procedure to attract attention to the heart was the importance which insurance companies attributed to irregularities of the heart. All of us have met the individual who was rejected twenty-five or more years ago because his heart was found to be skipping and who since the knowledge of this has been a semiinvalid or chronic sufferer from heart disease, even though during this time he has had a severe attack of typhoid or pneumonia; these experiences were trivial compared with the suffering and anxiety this individual has had because of his heart irregularity.

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Then again we have seen the discovery, during a febrile disturbance, of a murmur over the precordium result in long continued enforced quiet varying from complete rest in bed for many weeks to slight physical exertion. Then if you will add to all of this the one fact which cannot be disputed, that is, when the heart ceases to beat, life ceases to exist, you will have material enough to supply the imaginative and curious mind so that it builds for itself certain deductions held perhaps in the unconscious mind, but all the time a smouldering fire waiting until the torch of suggestion lights up a fuel which is of a highly combustible and convertible nature, producing a lasting impression upon the brain of such serious proportions that it will take years to efface the damage done in producing a chronic invalid. Physicians are frequently consulted by these chronic invalids complaining of abnormal sounds heard over the precordium or sensations ordinarily considered cardiac in origin.

It is with appreciation of these that I have selected a certain group of patients who consult an internist usually with the symptoms of a ready made diagnosis of heart disease or weak heart. It will prove of value to study the relationship of the heart to disease from the side of etiology, then from the question of disturbance of function, and lastly from the disturbance of structure.

Christian and Mackenzie (1) have done much to call our attention to the value of keeping these various subdivisions in mind in the final analysis of all cardiac manifestations. Until recently all the deductions referable to the heart and circulation were based upon the findings of structural changes in the postmortem room and the correlation of these findings with the physical signs found during life together with the complaint of the patient. Then, based upon the relation between the structural changes and the physical signs, the assumption was made that, when certain physical signs were present, certain structural changes were present in the heart.

The refinement of examination by physical methods, particularly instrumental, including the stethoscope, sphygmomanometer, polygraph, electrocardiograph, and the x ray, has been of certain advantage to many patients, and to the disadvantage of as many more. This is especially noticeable in cases where symptoms referable to the chest were similar in two classes, but with the difference that in the one class structural changes are found and in the other no structural changes are found. It must be obvious that it is distinctly harmful to assume that the sensation complained of by both must of necessity be associated with the heart because the postmortem examinations have shown structural changes.

It is perfectly logical to reason that the heart can be a part of a general diseased condition, that it can be the spokesman for the rest of the crying body, and, being a muscle, be affected just as all other muscles throughout the body are when toxemia is present. Everyone is familiar with the toxic heart associated with the acute infections, such as pneumonia, typhoid, diphtheria and scarlet fever, and it is not my purpose to discuss this phase of the subject. I wish to emphasize the expression of abnormal sensations in the chest usually considered of cardiac origin, but with some evidence of the heart being one of dysfunction regardless of structural changes. If then you will consider the importance of etiology in such cases, it will be a decided advantage.

Osler and McCrae (2) state that these cases present a symptom complex; that is, a symptomatic disorder without any organic disease of the heart, but causing extreme distress to the individual. They add a warning, however, that one should always remember that back of a symptomatic disorder there is some cause, and an effort should be made to discover it. Christian and Mackenzie (1) apply the term toxic and in so doing direct attention to the close relationship to etiology.

PAIN.

Chief among these sensations is that of pain. It may be of a dull aching character, more or less constant, or of a sharp stabbing nature. It may be referred to the precordium or only to localized areas of the precordium. The pain may radiate down the arm or up into the neck, sometimes having all the characteristics of the pain of heart disease. It is provoked by exertion, emotion, excitement, or after a heavy meal; sometimes it is more pronounced when in bed at rest or upon arising in the morning.

Such pains have been called pseudoangina, mock angina, toxic angina, spurious or false angina. Allbutt (3) urges that we drop the term angina for these cases and reserve it only for cases where definite disease of the aorta is present associated with hypertension. He mentions how formerly many noted physicians such as Gibson, Balfour, Nothnagel and others considered this type a forerunner of the typical terminal angina and cited cases in support of these contentions. Allbutt, however, considered angina minor only as the one to come ultimately to typical angina and the disease of the arteries was a necessary part of the picture. Christian and Mackenzie (1) agree that disease of the arteries may cause the pain by diminished blood supply to the heart muscle. They call attention to the observation that a pain can be produced in a normal heart by overexertion producing exhaustion of the heart muscle and that in an individual who is sick and suffering from pain, one should try to find the cause which produces the exhaustion. They consider the pain the cry of an exhausted muscle.

The patients who complain of pain are divided into two groups: The female group, in which the pain is usually of a dull aching character, or may be of the typical type of angina, and the male group.

The importance of sex in the consideration of the pain is without question. Broadbent said in playful exaggeration that it never interfered with a pleasant engagement. One should hesitate, no matter how severe the pain may be, to call it angina, if the patient is a female under fifty years, or in the menopause period. Of course one must be on the lookout for serious aortic disease in these patients and be constantly mindful of the fact that subjective symptoms affect females to a greater degree and more frequently than males.

Morgagni (4) called attention to the fact that the change in the pulse in these cases was usually scarcely perceptible whereas in the very serious type of a case very little change occurred. Associated vasomotor phenomena are cold hands and feet, red nose and clammy perspiration. If a patient of this group should have an irregularity, a murmur, or a slight enlargement of the heart the problem becomes a more difficult one. These are chronic invalids treated for chronic heart disease. All their activities cease and their degree of misery depends upon whether they consider their condition cardiac in origin or whether they are treated as heart patients. Many have been cured of their suffering when attention was directed to organs other than the heart. The state of the mind and the exact conception of the patient's own condition are important.

ETIOLOGY.

The condition of the intestinal tract is very important as it is at fault more often than any other part of the body. A secondary anemia, due to a focus of infection in the tonsils, sinuses, gallbladder, appendix, teeth, or genitourinary tract, treated by removal of the cause and less medication by iron, has produced marked changes in many patients and oftentimes complete amelioration of pain. The correction of unhygienic habits of eating, and sleeping, occupation and proper ventilation are more essential than the giving of drugs. A brief history illustrates several points:

Case I.—A woman, aged fifty-five years, consulted me because of severe pain in her left chest over the precordial region with radiation down into the left arm. She felt anxious while the pain was present. The pain was increased by emotion or excitement. It was not constant. She had had attacks at different times during the day and night for the past three months. Associated with the pain was a sense of constriction in her chest and for the past three months she noted dyspnea on exertion. She had never been ill before except for typhoid fever at twenty years of age. She was a heavy, well built woman with a red face, weight 190 pounds, height 5 feet 5 inches. Examination: Apex beat in the sixth interspace 16 cm. to the left of midsternal line. Blood pressure systolic 230, diastolic 130, aortic second sound ringing, systolic murmur over second right interspace and at the mitral area, heart regular. Kidney function tests: specific gravity fixation test normal, 1.009 to 1.030, phenolsulphonephthalein test two hours 40 per cent. total. Eye grounds by Dr. Kevand showed an old hemorrhage. Chemical blood examination, nonprotein nitrogen 47 mg., blood sugar 240 mg. per 100 c. c. Wassermann negative. She had several attacks of severe pain in the precordial region with marked distress and a sensation as if she were going to die. She received some relief at first from nitroglycerine but this soon wore off. She was treated for a hypertensive heart and with rest in bed she improved. At the next attack, in addition to the sensation felt in the precordial region, she suffered severe pain along the right costal margin radiating into the right shoulder, associated with vomiting and temperature. She became jaundiced. She was operated upon and gallstones were found and removed with drainage of the gallbladder. She had improved and has not had any recurrence of pain, dyspnea or constriction in her chest for six months. She has a blood pressure reading at present systolic 190, diastolic 100.

Babcock (5) sometime ago called attention to the close relationship of the gallbladder to the heart. Hamburger (6) also recently discussed it. The most difficult patients to manage are those who have been told that the trouble is cardiac because of the findings of some physical structural defect.

In some men the problem is very perplexing. If pain is present in a young individual one should suspect syphilis, especially if the pain is of the type of aortic disease. Characterstic pains which radiate into the neck and arm occur from other exhaustive influences. An anemia may be found and its cause may be many abscessed teeth, the removal of which causes marked amelioration of symptoms. The following case is of interest in demonstrating this factor as a cause:

Case II.—A man, aged forty-seven years, was well until eight months previous. Then he noticed a slight pain in his chest on exercise, starting in the centre of the chest under the sternum at the fourth rib and radiating to the right shoulder, but more particularly to the left. As soon as the patient stopped exercising the pain disappeared. Whenever he did any unusual exercise the pain would radiate down the left arm. One morning on attempting to mow the grass he was seized with a severe pain over the precordial region, with such a sense of tightness in his chest that he could not breathe.

It was found that for the past two years he had had dyspnea on severe exertion, but that ordinary exertion did not produce any dyspnea. He had had a slight cough, nonproductive, since his trouble. No history of edema. History of having had general soreness in muscles for past eighteen or twenty years, at times severe enough to interfere with his getting out of the chair. No history of indigestion; appetite good, bowels constipated for years. Physical examination showed a pale, somewhat emaciated man, skin lemon color, very bad breath, marked oral sepsis. Examination by Dr. Oliver confirmed the observation that the teeth were badly diseased. The arteries were somewhat tortuous, blood pressure right, systolic 130, diastolic 84; left, systolic 140, diastolic 90. Apex beat sixth interspace eleven and a half cm. to the left of the midsternal line, sounds over the mitral area were present, first sound somewhat accentuated; second right interspace, second sound accentuated. Fluoroscopic examination of the heart showed the aorta to be of normal size, some hypertrophy of the left ventricle, no bulging in the posterior mediastinal space. Glands were palpable under the angle of the jaw. Blood count showed a secondary anemia. Kidney function test including fixation test was normal. Since the removal of his teeth he has been entirely free from all symptoms referable to his chest. At the time that I saw him the doctor had treated him with nitroglycerine and vasodilators, and considered the case one of a disease of coronary vessels. The fact that he was not relieved by nitroglycerine and vasodilators should make one suspect either that he had a very serious type of true angina or more likely that the cause of the exhaustion of the heart muscle was outside the heart.

INFECTIONS.

The relationship of infections to subjective sensations in the chest is not always fully appreciated. A brief report of a case seen will illustrate this point:

CASE III.—A man, aged fifty-five, consulted a physician because of pain in his chest with a sense of constriction. The pain radiated down his left arm. He had an enlarged heart associated with a systolic murmur heard over the mitral and aortic area. His blood pressure was systolic 190, diastolic 100. Two weeks before he had had an infected finger which was incised, and the sensations had come on since then. He consulted a physician who diagnosed angina, and his diagnosis was confirmed by another. Nitroglycerine was prescribed. The patient became very nervous, anxious and fearful lest he should die suddenly. He lost weight rapidly until by complete abstinence from all cardiac remedies and a rest, he recovered and has remained free from symptoms since, seven years ago.

CONSCIOUSNESS OF HEART ACTION.

Another distressing complaint is consciousness of the heart action. In health we are unconscious of any action of the heart. The patient describes his complaint as a pounding or throbbing sensation particularly when lying down. The pulsations are usually regular and associated with faintness at times. This is called palpitation. One is impressed with the complaint of distress, sometimes very annoying, and the negative findings upon examination. It is characteristic of palpitation that its essential distinguishing feature is that the patient is conscious of the sensation. Sometimes the heart will be found to be rapid and again slightly irregular, but attention has been called to the fact that some patients with much faster and more irregular hearts are unaware of the change in the activity.

The subject of palpitation is deserving of study. It is usually considered of nervous origin inasmuch as it occurs in nervous people. The variety of conditions in which it is found would seem to indicate that it is due to some influence affecting the sympathetic nervous system. One should carefully question the patient as to its onset and the sensation experienced. Careful search for gastrointestinal and pelvic disorders should be made. Careful analysis of the patient's habits, the use of tobacco, coffee, tea and alcohol, should be made. The emotional life of the patient and the sexual life require careful and painstaking investigation. The quality of the blood should be studied and if an anemia is present, an effort should be made to discover the cause, remove it and so correct the anemia.

Palpitation is frequently present in hyperthyroidism, especially in the cases which come on suddenly associated with emotion, with a disturbance of the sympathetic nervous system and bulbar neurosis, a term used by Dieulafoy (7). The subject must appeal to one who has seen some of these rapidly developing cases of hyperthyroidism which follow sudden emotion. One of the early symptoms complained of is exhaustion; it may be extreme, the patients describe it as being all in, feeling without pep, no endurance. They suffer untold agony, they are full of ambition one day, and down and out the next day. The exhaustion is principally in the legs, sometimes brought on by exertion, and usually worse in the morning upon rising. At times the forehead has a sensation of a cold clammy perspiration upon it, there are changing moods of disposition, sometimes there is increased irritability of temper, some days buoyancy, other days shirking and shrinking from friends, emotional at times and very markedly depressed, and sometimes very impulsive. You will say that this is neurasthenia but Christian and Mackenzie (1) call it X disease, which means at least that we do not know. Associated with it are disturbances of the vasomotors, alternate flushing of the face and hands, cold hands and feet, red nose. These patients have at times a very active mind. The exhaustion may be so extreme as to lead to syncope. The symptoms complained of are inconstant and variable and it is because of this that search should be made in some other part of the body for the cause. How frequently, however, when the patient is seen has this condition been considered cardiac because an irregularity, increase in size of the heart or a murmur was discovered, or perhaps a high blood pressure?

The possibility of disturbed blood supply to the higher nerve centres by some hidden toxins should be considered. To illustrate how extreme this complaint may be and how it was considered of cardiovascular origin, I will relate a case in brief:

CASE IV.—A woman, aged fifty years, widow, mother of two children, family history negative, previous illness negative, no previous infection, chief complaint weakness, exhaustion, unable to walk across the room without fear of falling, exhaustion extreme, feels a sinking sensation while in bed, suffers from constant nausea, palpitation and constipation. She has been treated for high blood pressure and is afraid to walk for fear that she will have a stroke. She is conscious of her heart skipping. The examination revealed a pale, toxic looking woman, of a dirty lemon yellow color, teeth and tonsils negative, blood negative except hemoglobin slightly lowered, kidney function test and urine examination negative, heart not enlarged, sounds normal, none accentuated. Blood pressure systolic 200, diastolic 86. Rhythm of heart normal. Gastric analysis and stool examination negative. Because of the long continued constipation, the patient was put on a mixed diet. Exercise was ordered and the treatment was directed toward her intestinal tract. After considerable perseverance she finally recovered so that she walks today from three to five miles. In addition to the exhaustion she had another complaint, that of tightness in the chest of such a severe nature, when present as to cause alarm. It was like the other symptoms, variable, but because of its occurrence across the chest, and because it was aggravated by exertion, and because there was high blood pressure, the condition was thought to be due to arteriosclerosis.

(To be concluded)

The Cardiac Index of Goitre

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Studies of the thyroid gland as to its structure, effect on endochemistry, its secretions, the pathology to which it is susceptible, and degeneration, have made rapid progress since the original researches of Graves, Basedow, Rose, Kocher, Schrantz and others in Europe, and also Kendall, McGarrison (in India) and notably Crotti. With the Mayos, Boothby and Plummer have also contributed important data that have given us more correct guidance in this confusing field.

It is not within the scope of this paper to give significance to the subject of the thyroid gland *per se.* Rather shall it confine itself to the subject of correlation of the goitre with its cardiovascular influence. Kocher, the father of thyroid surgery, after three thousand thyroidectomies had fear only for cardiac collapse—nothing else.

There is no case of clearcut, truly active goitre or Graves's disease that has no trace of cardiovascular symptoms. These may vary from simple tachycardia to fatal edema and ascites, due to cardiac failure. The thyroid patient suffers because of his heart, and dies because of his heart.

Occupying as it does, a most intricate adnexal position in the neck, any change in the size of the thyroid gland almost at once impinges on the adjacent organs which are quick to respond to even the slightest stimulus or reflex. Thus there must be made a differentiation between simple enlargement of the gland which, with its pressure on some nerve or organ (especially the intrathoracic type), causes reflex disturbance of the heart, and that type of gland which causes definite toxic derangement by myocardial poisoning (thyrotoxicosis).

DIFFERENTIATION OF CARDIAC END RESULTS.

The mechanical goitre heart varies in its syndromata from mild cardiac disturbances, characterized by dyspnea, cough, displaced heart and other symptoms, to most severe cardiorespiratory embarrassment, especially so, when an intrathoracic gland exerts pressure on either trachea, aorta, vagus, recurrent laryngeal nerve or other neighboring organ.

In goitre heart, tachycardia is the most constant and typical sign pertaining to the cardiovascular apparatus. It never fails! And it possesses one almost pathognomonic characteristic, i. e., the pulse is constantly high, under all circumstances! Never is a normal ratio reached, and even when taken while the patient is asleep the pulse registers between 95+ and 110+. There are, of course, times when the rate increases, so that paroxysmal tachycardia suggests itself, but during the remissions the pulse will still be found at a high ratio. Thus it is that our otherwise fairly good indices of cardiovascular efficiency, such as the Crampton blood ptosis index and the Barringer tests, are of little avail. They would not in these cases indicate myocardial excitability. Very often psychoneurotics and hysterics with tachycardia and a few other masking signs, perhaps such as pallor, loss of weight, insomnia, and other symptoms, are suspected of having thyrotoxicosis, but there is absence usually of the great pulse disproportion due to exertion. Also the basal metabolism is nearer normal. There are also more definite variations in the health of these neurotics than in a true goitre case.

As Thompson wrote, "The goitre pulse beats faster than in fever, and does not change day or night for long periods of time, and it remains constantly at its high rate!" Furthermore, these patients have but moderate anxiety, no great precordial pain, and surprisingly little dyspnea. In tachycardia the paroxysm may last minutes, hours or days, and with the same suddenness that ushered in the attack, all signs disappear. Months may elapse before another attack ensues. In the more severe cases, the paroxysms become more and more frequent, till finally the myocardium shows the effects of its enforced overactivity. There then follow all the manifestations of decompensation. Whether increasing fatigue substances, the allied kenotoxins and endocrine catabolism, have a cumulative action that suddenly overburdens the cardiovascular physiological equilibrium, or whether vagal intoxication reaches a high point of irritability that acts reflexly on the heart as a paroxysm of rapid beating, seems probable in the light of our recent war experiences. It was found that after prolonged fatigue, paroxysmal tachycardia suddenly affected many soldiers in action. By swallowing a rather large mouthful of some firm foodstuff, such as bread or meat, especially if at the onset of an attack, and notably if the bolus was large enough to make deglutition an effort, the paroxysm stopped almost at once. Probably in this way the vagus was stimulated and counteracted the sympathetic. When there are other causes of tachycardia such as infections, intoxications, cachexias of obscure origin or neuroses, endocrine disturbances other than thyroid must be ruled out, either by observation, exclusion, or possibly opotherapeutic diagnosis. As an example of one of the recent causes of tachycardia: The draft boards found many candidates owing their exemption tachycardia to previous strychnine injections. Studying a goitre case we find a pathological cycle which shows a persistent tachycardia, due no doubt to the following factors which act in sequence: 1. Increased blood supply of the gland; 2, its resultant increased functioning, and 3, the increased function in turn again causing an increased blood supply, through its action on the depressor nerve which causes vasodilatation. Thus we have a vicious cycle wherein each segment augments the effects of its fellow. In these cases we also find palpitation.

This is not a tachycardia, and should not be confused with it. Palpitation is the distress felt by a patient because of his tachycardia; he has become conscious of his cardiac activity. For example, in pyrexic states, a high pulse rate may be found, but the patient does not complain of it, whereas in goitre, even with only a mild pulse increase, there may be severe distress. Posture, food, exertion, excitement or exhaustion, may aggravate this condition. It may be so pronounced, especially in neurotic or chlorotic individuals, as to cause severe anginoid pains and in some instances complete loss of consciousness.

In many early stages of thyrotoxicosis, careful physical examination does not reveal any important pathological status from a cardiac viewpoint, whereas in the more established cases we find on:

Inspection.—The precordial heave is usually so marked that the entire precordium seems to throb with the pulse. There may not be one sign in the cervical region.

Palpation.—The precordium often transmits a prominent, bounding thrill to the examiner's hand. The apex is, as a rule, displaced to the left.

Percussion.—This is unsatisfactory, and does not check up with any safe degree of accuracy to be of value. However, many writers have found increased areas of auricular and ventricular dullness, and furthermore they report recession in the outlines and boundaries of the heart as the patient improves. Orthodiascopic delimitations are more accurate.

Auscultation.—In almost every case, even those of short duration, auscultation reveals a murmur at the base of the heart which radiates from there to the other orifices and is best described as a soft blow with its point of maximum intensity over the pulmonary valves. This murmur is systolic in time, and in the early type of cases indicates with fairly good accuracy dilatation of the heart. Often this murmur is mistaken for an organic mitral or tricuspid lesion, only to entirely disappear as the patient improves, and as the myocardium again becomes firmer and the dilatation recedes. The murmur is due to mechanical deficiency of the valves which cannot accommodate the stretching chambers, and not to pathological endocardial deposit or destruction.

Endocardial lesions accompanying Graves's disease are rarely found. Thyroxin possesses a sinister affinity for the myocardium, for it takes but a short time after the onset of the disease to weaken and render the cardiac muscle cells friable and easily exhaustible. However, as medical or surgical cure is effected, the heart soon again returns to its normal status, and once more the orthodiascope delimits such hearts in normal outline and shadow thickness. In certain cases the cardiac dilatation may become so extensive (especially in those patients who have previously suffered some myocardial mutilation through infection, intoxication or otherwise) that then the murmurs become more marked, ending perhaps as a permanent tricuspid insufficiency with its ascites. The factors that make dilatation such a quick process are many and one mechanical feature is of interest: 1. Vasodilatation exists in all cases of goitre; 2, increased time activity of the heart exists; and 3, therefore it is evident that the cardiac chambers cannot empty their full quota of blood with each systole. The heart, as it were, gulps in its effort to expel the entire ventricular blood content, but the proportion is on the side of vasodilatation, rather than on the factors which effect a slow, forceful, complete systole.

To proceed further with the clinical examination: The sphygmographic tracing shows at once a typical *pulsus celer* with small volume and characteristic dicrotism. The electrocardiographic tracing shows increased activity time, inversions in the various leads, more usually in the S wave 3rd. lead and especially so where dilatation or some degree of hypertrophy exists. The electrocardiograph has cleared up the reason for some of the arrhythmias that are encountered in these toxic goitre heart patients. It was recently believed that when the proportion between cardiac output or systole was unequal, and that the vascular trunk could not accommodate it, that arrhythmia was due to this overburdening, so to speak. The electrocardiograph shows us that the cause of the irregular pulse is due to myocardial excitability, and that the thyroxin poisoning causes extrasystoles. This is a sign of myocarditis, and especially where marked phasic variation exists is it found that the myocardium has been seriously impaired. It has, so to speak, lost its balance.

Prognosis can be tempered by the following, in proportion to the extent of the findings:

1. If arrhythmia persists (mild involvement).
2. If palpitation persists (moderate degree of thyroxic myocarditis).
3. If murmur persists (dilatation marked).
4. If palpitation plus precordial pain, thrill and perhaps some slight edema is found, the prognosis must be a serious one. On the other hand rhythmic hearts may also be seriously impaired, but with careful study operative risk can be more or less accurately adjudged. The test of functional efficiency that has given the best guidance in this type of case is the Katzenstein test. Pulse and blood pressure are carefully recorded before the patient's femoral arteries are both compressed below Poupart's ligament, the compression is held till both pulses are lost. Again the pulse and blood pressure are carefully recorded.

1. If blood pressure increases and the pulse slows down, the patient's condition as to the heart is excellent. 2. If there is no change in blood pressure or pulse, there is a slight impairment in myocardial balance. 3. If blood pressure remains unchanged but the pulse increases moderately, then risk is greater. 4. If blood pressure falls and pulse increases then the patient is a most hazardous risk and should be operated on only in vital necessity, and then under a local anesthetic, with proper supporting stimulation.

Estimating the Intrapericardial Pressure

By G. ARBOUR STEPHENS, M. D., B. S., B. Sc.,
London,
Consulting Cardiologist to Edward VII Welsh National Memorial Association.

The accompanying photograph shows a manometer to whose bent end T is attached a rubber tube, which communicates with an aspirating needle N. The tube contains colored water, and the scale is divided into centimetres.

At a postmortem examination when the chest has been opened without cutting into the pericardium, the needle is inserted into the pericardial cavity and the levels of the fluid have to be watched.

In health my experience has been to find the fluid on the T or tube side in normal cases to rise about four centimetres, or in other words there is a suction action due to the negative pressure in the pericardial cavity.

Professor Halliburton performed a few vivisection experiments which tended to corroborate my contention that in life the suction action is necessary for lubrication purposes to keep the fluid at the same thickness all round the heart, and of course whatever sounds come from the heart have to traverse this fluid.

My opinion is that this fluid by its movements produces much of the sound associated with the heart movements, for if a small quantity of fluid be placed in a small rubber balloon, and the neck tied, when the end of a stethoscope is placed in one part and the other part compressed gently and rhythmically by the forefinger, one can hear the typical lubb dup of the heart, while a variation of the quantity of the fluid can give rise to socalled murmurs.

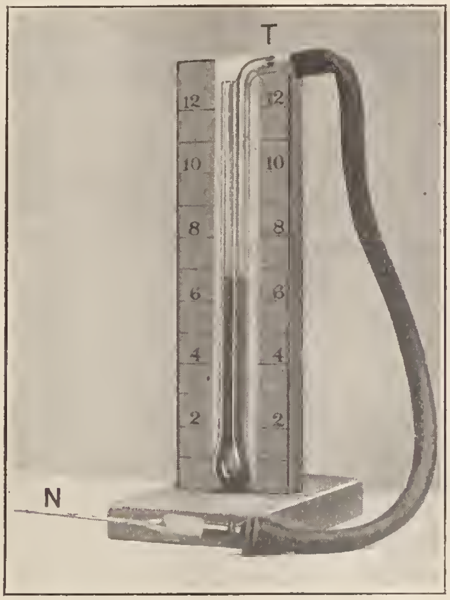

Fig. 1.—Manometer used by author to estimate intrapericardial pressure.

In cases of heart failure I have found that on inserting the needle that the fluid levels are not disturbed, or in other words the negative pressure has disappeared. When this suction action has gone there is nothing to keep the fluid in position all round the heart, and as a consequence the lubrication is affected.

The success of all internal combustion engines depends on the satisfactory lubrication of the engine, and this applies with full force to the heart. With the lubrication of this selfacting pump disturbed, it naturally follows that its work becomes more onerous and the energy required for similar functions in health is increased. In order to establish the exact, or the more or less exact relationship of this variation of negative pressure to disease, it is essential that a very large number of statistics bearing on the fact should be obtained.

Together with variations of pressure we get variations of the fluid both as regards quality and quantity. In Bright's disease where the quality and also the quantity of the body fluids are considerably modified, we find that change represented in the pericardial fluids also.

As with internal combustion engines the quality of the lubricating oil is of as great importance as the quantity, else the products produced by overheating or chemical reaction have a very injurious action on the engine itself, so with the heart if it has to run in a nonsuitable fluid it naturally follows that some deleterious effects are produced in the musculature of the heart.

With a moderate excess of pericardial fluid and a modification of the negative pressure the position of the heart is subject to considerable variation of position according to the attitude of the patient: if such a patient is sitting up, the sounds of the heart and the waves of the cardiogram are quite different from what one gets when the patient is lying down.

Why the negative pressure should be kept in health at four centimetres of water I do not know, but this pressure varies as the result of exercise as does also the quantity of fluid: and judging by a splashing sound which I once heard in a case of angina, at the oncoming of an attack, it seems to me that some attacks of angina can be put down to a sudden disturbance of the pericardial pressure and possibly a modification of the quantity and quality of the fluid, for a splash can only be produced where there is room for a variation of pressure or where that pressure varies shall we say of its own accord.

The instrument described above can be used in cases where a postmortem examination is not allowed, for by inserting the needle at the inner end of the fourth intercostal space one can determine if there is a negative pressure or not, for if it is present I am of opinion that the heart failure was not the cause of death.

61 Walter Road, Swansea.

Radium Treatment in Cancer of the Esophagus.—Guisez (*Presse médicale*, March 26, 1921) reports three cases of cancer of the esophagus in which favorable local action of radium treatment seemed quite plain. The diagnosis had been made by esophagoscopy and examination of an excised piece of tissue. Rapid functional improvement took place, and in the three cases the tumor disappeared.

Editorial Articles

THE RUSH OF LIFE.

As a scapegoat for the existence of many ills, especially the increasing proportion of deaths from heart disease, the hustle and bustle of modern life is, from time to time, called into service. It is a goat which has lived longer than any ordinary animal of this name, for if one reads history he finds that, a half century or a century since, men were, according to the statements of observers of those times, rushing about like mad and taking inadequate rest between rushes. Even the staid George Washington had the speed mania. He desired no other traits in a horse save that it would "go along" at breakneck speed, and he was up in the short hours, had breakfast by candlelight, and was off after the hounds before day, at least three times a week. All very bad for the heart.

Those who in earlier days bewailed the hurry and rush of their generation say nothing of death from heart disease as a consequence, for at that period men were privileged to a wider choice as to the manner of their demise, and they were more frequently taken off at a time of life when the heart was still in good working condition. Besides, men were not so officially and officiously curious as to the manner of their fellows' departure. At the more advanced ages to which we now persist, there is bound to be more sudden snapping of the cord, though heart disease may be, in itself, a scapegoat, since some explanatory cause must be vouchsafed by guess in lieu of better knowledge.

The heart may end its beatings, not from heart disease, but from kidney or arterial disease and from causes very far removed from hurry and bustle. In fact, the muscular efforts put forth in vigorous activity, while bad for a bad heart, may be good for a good one, since the exercise helps to burn up materials that would otherwise burden the kidneys and injure arteries, and indirectly lead to cardiac overstrain.

Speaking of heart disease, some revision of opinion seems to be going forward in regard to diagnostic signs. One clinician who speaks with much authority has put forward the important dictum that a mitral murmur means nothing, so far as the presence of leakage is concerned, unless there is, at the same time, enlargement of that organ. Also it is asserted by another student that the murmur usually considered pathognomonic of mitral stenosis—the presystolic murmur ending in an accentuated first sound—is really a systolic murmur caused by regurgitation through the mitral valve. There is good physiological proof that the auricle normally exerts little, if any, pressure when the blood descends from it into the ventricle. It may be that the auricle strengthens with mitral stenosis, but whether sufficiently to produce the loud murmur usually attributed to it is not certainly known. However, where this murmur is present there is certainly some valvular trouble. The presence or absence of accentuation of the pulmonic or aortic sounds has also, unless these sounds are very marked, been questioned of late as of much diagnostic importance in connection with certain heart lesions.

PSEUDOANGINA PECTORIS.

Moulinier, of Bourdeaux, has produced some interesting work on the subject of pseudoangina pectoris of venous origin, a subject upon which much remains to be said. It would seem that numerous functional disturbances accompany this condition and it is important that one should be conversant with them, because of recent years a prognosis based on accepted principles is usually severe. As we begin better to distinguish the false anginas from the true ones, the prevalent pessimism of the profession will probably be lessened, to some extent at least.

As previously stated, the pseudoangina described by Moulinier is of venous origin, and this conclusion was reached by stethoscopic signs and data obtained by blood pressure determinations. The interpretation of the process is that there has been a break in the equilibrium usually existing between pulmonary and the aortic symptoms, a high aortic blood wave, and a rise of the right intraauricular pressure, all without any reaction of this hypertension on the left auriculoventricular valves, or resulting in any important extra work on the part of the myocardium. The origin of this sudden increase in the force of the blood wave cannot always be discovered in the left ventricle, aorta, or arterioles, so one must of necessity turn to the venous system. A sudden resistance occurs here which, by causing an obstacle to the arterial wave, causes the pressure to increase backward from the capillaries to the aorta; hence a painful distention of this vessel and considerable work on the part of a myocardium just barely sufficient.

This condition is encountered in subjects with lesions of the venous system, usually ectasis, with functional digestive disturbances, such as portal hypertension or disturbances of the hepatic circulation, often with a weakened myocardium. Then, during the process of digestion abdominal plethora follows and if at this time the patient starts to walk the muscular work increases the flow of blood and throws a considerable amount of blood into the already overcharged return circulation. One of the peculiarities of this type of angina is that both the pain and the distress quickly disappear, because the capacity of the venous system soon establishes the equilibrium. The paroxysm has neither the duration nor the gravity of true angina pectoris and the prognosis may be considered relatively good.

INFLAMMATORY STENOSES OF CARDIAC REGION OF ESOPHAGUS.

Between the posterior aspect of the heart and the diaphragm the esophagus is in relation to a small space about one to two centimetres in height, resulting from a progressive separation of the pericardium and diaphragm, the former drawn upward, the latter downward. This subpericardial portion of the esophagus is oval and becomes progressively widened from the spot at which the esophagus ceases its relations with the pericardium. The gullet becomes narrowed at the diaphragm because it is encircled by a ring formed by the pillars. The opening in the diaphragm is in reality a slit through which the gullet passes to reach the abdomen, and it is now known, since Rouget's researches, that the walls of the esophagus are united to the edges of this slit. Below the diaphragm the esophagus progressively enlarges up to the stomach, the normal cardia is not narrow and no line of demarkation limits it outside, except on the left where the wall of the gullet forms an angle with the greater tuberosity of the stomach. This is the epicardia.

Histologically, the gastric mucosa is distinctly differentiated from that of the esophagus, but the muscular fibres are not separated, so that the so-called cardiac sphincter is a myth. The spot at which the esophagus is bridled by the muscular fibres of the diaphragm appears to be the favorable point for the development of a pathological stricture extending more or less to the subjacent portion.

Chronic inflammatory stenosis of the cardia is a stenosis which is neither neoplastic, traumatic, nor the ultimate product of an acute inflammatory process. Appearing at any age, but especially in male adults, it has as etiological factors, tobacco, alcohol, spiced and otherwise irritating food, and varices of the esophagus. From such common causes as these an irritation is set up at the diaphragmatic portion of the gullet. By reflex action contracture of the esophagus intervenes and in its turn reacts upon the eroded esophageal mucosa and, as in the case of anal fissure, prevents cicatrization. Although primary spasm of the esophagus cannot be eliminated as a possibility, it is far more probable that this is secondary from the fact that often the fissure is minute, hidden in the folds of the mucosa, and consequently may be overlooked in esophagoscopy.

Pathologically, only ordinary inflammatory lesions are found: a thickened mucosa and submucous irritation but never epithelial products or cancerous degeneration. After a sudden or progressive onset, when fully developed, the process is made manifest by dysphagia, even for fluids, vomiting of the esophageal type, emaciation and considerable weakness. Physical examination, auscultation, passage of the sound and radioscopy all point to a stricture of the lower portion of the gullet. The esophagoscope reveals local lesions in the cardiac region and these can also be seen during the phase of cicatrization. The evolution of the process is very peculiar. Its progress is extremely slow, extending through months or even years, causing only a progressive loss of strength due to absence of nutrition, but without general toxemia. Therefore, from this fact, the prognosis is quite favorable.

The diagnosis is that of all stenosing processes of the gullet, but the possibility of neoplasm must be carefully considered. Among the functional symptoms the evolution is important as this is infinitely longer than in malignant disease, and also the absence of the yellow skin of cancerous cachexia. Locally radioscopy will reveal a pouch longer than that found in cancer, while esophagoscopy will reveal the aspect of the lesions and in the phase of granulation, particularly, a small, less infiltrated and tumefied mass and bleeding less readily than in cancer. Nevertheless, a bit of the lesion should be removed for biopsic purposes. Treatment consists of gastrostomy in the first place in order to feed up the patient, as well as to procure functional repose of the esophagus. Local treatment, such as is employed in stenosis of the gullet in general, will be resorted to later.

PATHWAYS.

Those who would follow the pathways of medicine must be prepared for journeys replete with hardship, filled with emotional experiences, crossed by disappointments, and even for the most earnest—a thin reward. The life is full of opportunity for external expression, for constructive effort. Much of this seems thankless. A glimpse of what one may expect in choosing the medical profession as a career may be found at times if we look in retrospect and accept the short cut of experience from those who have gone before.

Bjerre in his charming delineation of the development of the modern school of psychopathology (*History and Practice of Psychoanalysis*, Paul

Bjerre, Boston: Richard G. Badger) has selected a letter written by Wetterstrand from Upsala, September 5, 1866, to show the state of mind of the medical student at the end of four years' study.

". . . . Through a letter from father I have heard that you would like to change your determination about becoming *vitæ genus*. Without wishing in any sense to impose anything upon you or your opinions, for in such matters as this you are, and should be, entirely alone regarding your decision, still, I wish to say a few words to you before you heedlessly start in upon a new trade which is doubtless as yet unexplored by you. The profession of medicine is unexpressibly laborious, both during the period of preparation and throughout the whole of practice. He who chooses this profession should first consider well. He has *dedicated the whole of his life, every minute of it,* to the struggle against human suffering in all its forms, he has consecrated himself to an unceasing contemplation of lamentation, misery and death. Not only during the day, but during the night as well, must his work go on. In hospitals, in every kind of emergency, in pest-houses, the material for the building of his life is gathered together. If he desires—and that he must do—to advance in science, he must study incessantly. He has no moment to himself. If he sometimes thinks, this hour is mine, he thinks what is not true; the time does not belong to himself, but to those who are in distress and suffering. The practice of this profession demands almost superhuman power. The physician must stand ready for everything and everybody. A constant danger threatens him, the sword of Damocles hangs continually over his head; I mean Death, the inevitable, with which he is always in contact. If one takes into consideration the years of preparation, those of the medical student are quite different from those of students in other fields. In the anatomy class, in the midst of decomposing mutilated bodies, he has opportunities to think over the passing of life and the certainty of death. It is true that scientific desires are here appeased with knowledge concerning the wonders of the construction of the human organism and explanation of the mystery of the phenomena of life. But how is this insight reached? By means of mutilation of bodies like our own and by the dissection of living animals. This is the only path upon which the student of medicine may tread. I myself have experienced inexpressible things. The knife trembled in my hand when I made my first incision into a cadaver; how must it then be to use it upon a living subject? The loathsome smell of the autopsy room, the ever constant danger of being poisoned in the laboratory, still pursue me. The state of mental tension, in which one must continually live, is impossible to describe."

The foregoing picture wherein we see described a small portion of the medical student's life could be continued to contain all of the trials of the medical man's life when his student days are carried into the hospital wards and finally into his life in relation to his patients. He is not even sure of many of his successes, for Nature must be given credit for many cures. He is ever shouldering the blame for his apparent failures, as if his were the power forever to circumvent disease and death.

It would be well if every prospective student of medicine would read this excerpt from the letter of a Scandinavian physician to his younger brother who was contemplating the study of medicine. More than likely some would be turned aside from the idea of following a medical career, but those who would enter the field would do so with their eyes open, and there would be small danger of a skimping of tasks in order to make the work conform to any illusions which had been created in phantasy.

PHYSICIAN-AUTHORS: JOSEPH RODMAN DRAKE.

In Westchester County, N. Y., but a few minutes' walk from the Hunt's Point subway station, there is a simple little shrine which is visited by strangers from many lands. It is the grave of a young physician-poet, Joseph Rodman Drake, author of *The American Flag* and *The Culprit Fay*. The Bronx Society of Arts and Sciences has erected a plain marble shaft over the grave bearing Fitz-Green Halleck's oftquoted lines:

"Green be the turf above thee,
Friend of my better days;
None knew thee but to love thee,
None named thee but to praise."

Lafayette paused in meditation at this grave, and celebrities of many nations have visited it, but there are few New Yorkers who even know where it is.

Halleck's lines have been called "the manliest little elegy of personal loss in American literature." Halleck and Drake were great friends—the Damon and Pythias of American poets—the former a bank clerk and the latter a consumptive physician, who died at his residence, 34 Park Row, New York, early in the morning of September 21, 1820, passing away at about the same early age as that other more famous physician-poet, John Keats, who was born in the same year, 1795, and whose *Endymion* Drake greatly admired and frequently read aloud to his friends, Halleck and Dr. Langstaff.

Drake and Halleck were two of the most famous of early day poets of New York. Together, by their *Croaker* poems in the New York *Evening Post,* they stirred and amused the entire city. As Washington Irving put it, the *Croaker* poems "set one half of New York mad with anger and the other half mad with delight." The poems were, for the most part, facile and pointed skits on contemporary politics, events and people, and their authorship was kept secret for a long time. "Croaker & Co." was the *nom de plume* behind which the two poets concealed their identity. The first poem of the series, *Lines Addressed to Ennui,* by Croaker (Drake), was published in the *Evening Post* on March 10, 1819. Allen Nevins in his history of the *Evening Post* calls it the "most famous series of satirical poems, the *Bigelow Papers* excepted, in American literature," and we are assured by the same authority that the origin of the series was purely casual. Drake and Halleck were spending a leisurely Sunday with a common acquaintance, says Nevins, when as a diversion Drake wrote several lines upon ennui, and Halleck capped them. The verses were sent to William Coleman, editor of the *Evening Post,* who immediately published them and called, through his paper, for more. Later when the two young poets revealed their identity to the editor he is said to have exclaimed: "My God, I had no idea we had such talents in America." (This was that barren period in American literature which justified Sydney Smith's famous query, "Who reads an American book?")

The two young poets had called on Coleman in response to his request for an interview, during the course of which, says Nevins, "the delighted editor continued in a strain of compliment and eulogy that put them both to the blush." Before taking their leave the poets bound Coleman over to the most profound secrecy, and thus the general public, extremely curious in the matter, was kept guessing. Altogether there were forty-five poems in the Croaker series and it was in July, 1819, that the only one of the lot that was destined to live appeared. This was *The American Flag,* a lyric "full of the old fashioned expansive and defiant Americanism, and with its flare of imagery and blare of sound, still capable of stirring the blood of anyone but a professional critic." Every schoolboy knows it:

"When Freedom from her mountain height
  Unfurled her standard to the air,
She tore the azure robes of night
  And set the stars of glory there."

This poem was entirely the work of Drake, except the last four lines, which were written by Halleck, who disapproved of the last half of the final stanza of the poem as written by Drake and dashed off four substitute lines which Drake accepted. Drake's other famous poem, *The Culprit Fay,* had an equally exceptional origin. It was done on a dare. In the summer of 1816 Drake, Halleck, James Fenimore Cooper and Drake's brother-in-law, Dr. de Kay, were discussing the poetical uses of Scotch and European rivers in general and the lack of romantic background of American rivers. Cooper and Halleck, it is said, contended that the lack of historical associations made it impossible to write poetry about American rivers. Drake disagreed with them, and by way of proving his point he wrote, in three days, *The Culprit Fay,* which many critics have said is the best fairy story in American verse.

Joseph Rodman Drake was born in Westchester County on August 7, 1795. His father, said to have been descended from a brother of Sir Francis Drake, died when he was quite young and the family had to contend against adverse circumstances. There were four children, including three sisters. However, Drake managed to get a good education and studied medicine under Dr. Nicholas Romayne, who was very fond of him. In October, 1816, he received his medical degree and shortly thereafter married Sarah, daughter of Henry Eckford, a shipbuilder, "a connection which placed him in affluent circumstances." After his marriage he visited Europe with his wife and Dr. de Kay, who afterwards wrote a volume of *Travels in Turkey* and was author of the zoological portion of the *Natural History of New York.* Drake's health, never of the best, failed rapidly after his return from Europe, and the Croaker poems ended in the fall of 1819 when he went to New Orleans to spend the winter. Returning to New York the following spring he was unable to continue his medical practice and died September 21, 1820.

Drake had a fondness for writing poetry which began in early childhood. It is said he composed a rhymed conundrum at the age of five and that between that age and ten he wrote many verses. *The Mocking Bird,* the earliest of his poems which has been preserved, was written when he was a mere boy. Whatever the merits of the poetry of his mature years, he has a permanent place in American literature.

SMALLPOX.

Official reports from ten states for the month of November, 1921, give the number of cases of smallpox as 1,184, and for the week ending December 17th, 730 cases of this disease are reported from twenty-four states. While the highest proportion of cases occurred in the middle, western, and southern states, the eastern states are not all exempt.

As with some other diseases, smallpox is not so much on the increase in some sections as is the reporting of cases. In one state of the middle west an examination of college students showed that some ten per cent. of them had had the disease. It had developed a number of years before the pupils entered the school, probably on the average at the age of ten. There must have been ten years ago as large a proportion of cases as there is now.

We do not know as to the virulence of the disease, though there were deaths from it then, and the Public Health reports from cities for the week ending December 17th give a fatality rate for reported cases of about five per cent. The cases in the western states at least, are not confined to immigrants who had not been vaccinated, but are common among the native stock. These, of course, have not been vaccinated. In a word, the presence of smallpox means absence of vaccination.

Our forbears of only a generation back were glad to make use of most crude, and even dangerous, methods of vaccination in order to protect their children from a disease which, though practically extinct at the time, had, by inheritance, or fireside hearsay of their grandsires, not lost its late terror to the imagination. And yet with all the lack of knowledge of sanitary technic and with the use of miscellaneous sources of vaccine there were, if any, fewer mishaps for a generation from vaccination than deaths from the disease during a week of the past year. The present generation has forgotten the deserved dread in which this disease was but lately held. Will it be necessary to develop fear of it afresh through another scourge?

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Obituary.

SIR GERMAN SIMS WOODHEAD, K. B. E., M. D., F. R. C. P. (Edin.), F. R. S.,

of Cambridge, England.

Sir German Sims Woodhead, professor of pathology in the University of Cambridge, died on December 29th last. He had been in failing health for some time but the end came with little warning. He was a Yorkshireman. In 1881 he obtained his degree of M. D. at Edinburgh University, receiving the gold medal for his thesis. He shone in athletics, representing his university on the running path and as a member of the Rugby fifteen; later he gained his international cap for Rugby. Woodhead was elected F. R. C. P. Edin. in 1881. He continued his medical studies in London, Berlin and Vienna, afterward becoming demonstrator of anatomy and physiology in one of the Edinburgh extramural schools until he was elected demonstrator of pathology in the university. From 1887 to 1890 Woodhead was superintendent of the laboratory of the Royal College of Physicians of Edinburgh, and in 1890 he was appointed director of the laboratories of the Conjoint Board of the Royal College of Physicians of London and the Royal College of Surgeons of England. Until his appointment as professor of pathology in the University of Cambridge, Woodhead had been closely associated with the *Lancet.* In 1899 he went to Cambridge and made a most excellent professor of pathology, although his work was a good deal hampered by lack of funds. Like many British laboratory workers he was frequently expected to make bricks without straw. However, his tenure of the chair of pathology at Cambridge witnessed a surprising development of the medical school and the construction of the large present day laboratories.

Woodhead was greatly interested in the study of tuberculosis, an interest he maintained up to the time of his death. He was an honorary member of the Henry Phipps Institute, Philadelphia, and in 1903 gave the lecture on tuberculosis in Philadelphia. At the sixth international congress on tuberculosis held in Washington in 1908, he was awarded a gold medal by the Congress for his collection of specimens showing the changes produced by tuberculosis in various organs, both in human and animal subjects. Of recent years he, together with Sir Clifford Allbutt, took a keen interest in the organization and support of the Cambridgeshire Tuberculosis Colony at Rapworth Hall. The writer, at the time of the meeting of the British Medical Association at Cambridge in 1920, visited this colony and was greatly impressed both with the place itself and its organization and efficient management, largely due to Dr. Varrier Jones, the medical man in charge. In 1902 Professor Woodhead was made a member of a Royal Commission on Tuberculosis appointed to test the statements of Professor Koch with regard to human and bovine tuberculosis. He also took a deep interest in the study of heart disease.

While not a voluminous writer he was the author of several important works. When in Cambridge he published the first edition of his *Practical Pathology.* In 1885 he published *Pathological Mycology,* and in 1891 a work on *Bacteria and Their Products.* In 1920 he published, in collaboration with Dr. Varrier Jones, a book entitled *Industrial Colonies and Village Settlements for the Consumptive.* Woodhead was the first editor of the *Journal of Pathology and Bacteriology,* the official organ of the Pathological Society of Great Britain and Ireland. A memoir of Professor Woodhead would not be complete without alluding to the fact that he was an enthusiastic and ardent supporter of temperance. As a man, Woodhead was even greater than as a scientist. He was beloved by all who knew him. No better idea of what he was to his friends can be gathered than that eloquent tribute to his memory in the *British Medical Journal,* January 7, 1922, signed C. A.

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News Items.

Mme. Curie Elected a member of the French Academy.—The opposition to the election of Mme. Curie to membership in the French Academy of Medicine was withdrawn and on February 7th she was elected to membership. It is the first time that a woman has been elected to full membership in a French academy.

New York Tuberculosis Association. — Dr. James Alexander Miller was elected president of this association at the annual meeting held on February 7th and other officers were elected as follows: Mr. Homer Folks, vice-president; Mr. Thomas W. Lamont, treasurer, and Dr. Nathan E. Brill, secretary. A decrease in tuberculosis in New York was reported, which, in the opinion of the association, was the result of prohibition and a higher standard of living.

Cancer Research in Montreal.—Lord Atholstan, who recently offered $100,000 for a cancer cure, has given another $100,000 to be devoted to cancer research work.

Additional Harvey Lecture.—An additional Harvey lecture will be given on March 4th by Dr. William M. Bayliss, professor of general physiology, University College, London. His subject will be Vasomotor Reactions and Wound Shock.

Association of Tuberculosis Clinics.—At the annual meeting of this organization, held at the New York Academy of Medicine on January 26th, Dr. James Alexander Miller was reelected president. Dr. Louis I. Harris was reelected vice-president and Dr. J. Byron Deacon was elected secretary and treasurer.

Dr. Pilgrim Honored.—A testimonial dinner was given recently to Dr. Charles Winfield Pilgrim, of New York, on his retiring as chairman of the State Hospital Commission after forty years' continuous service. A silver service was presented to him by the one hundred and fifty state hospital associates who were present.

Civil Service Positions.—Among the positions for which the New York State Civil Service Commission will hold examinations on February 25th are assistant physicians and surgeons in state and county institutions and medical assistant to the director of Grasslands Hospital, Westchester County. These positions are open to nonresidents.

Medical Club of Philadelphia.—Dr. Ernest Laplace was elected president of the Medical Club of Philadelphia at the annual meeting held on January 20th, and other officers were elected as follows: Dr. S. MacCuen Smith and Dr. Alexander MacAlister, first and second vice-presidents, respectively; Dr. William S. Wray, secretary; Dr. Lewis H. Adler, Jr., treasurer, and Dr. Francis X. Dercum, governor.

Influenza and Pneumonia in New York.—The health authorities believe that the peak of the epidemic has been passed. Reports issued by the department on Monday, February 6th, show a sharp decline in the number of cases recorded. From January 1st up to February 6th 9,285 cases of influenza, with 187 deaths, were reported in New York, and 3,784 cases of pneumonia with 1,523 deaths. In comparison with the epidemic of 1918-19, the present outbreak is mild.

Personal.—Dr. Wilbur H. Haines has been appointed attending urologist to St. Mary's Hospital, Philadelphia, Pa., with entire charge of all urological surgery and out patient clinic. At present he is chief of the urological department at St. Agnes Hospital, assistant professor of urology at University of Pennsylvania Post-Graduate School, and assistant urologist to the Lankenau Hospital.

Dr. Smith Ely Jelliffe, of New York, has been elected president of the New York Psychiatric Society.

Dr. William V. P. Garretson, of New York, has been appointed a member of the attending staff of the Fifth Avenue Hospital, as associate neurologist.

Dr. William A. Downs was recently elected president of the medical staff of St. Luke's Hospital, New York.

Homeward Hospital.—Dr. Ira L. Fetterhoff announces that he has purchased the Biedler-Sellman Hospital, at 2714-2728 North Charles Street, Baltimore, and will operate it under the name of Homewood Hospital. It will be standardized as rapidly as possible.

Sleeping Sickness in Russia.—It is reported that sleeping sickness is epidemic in Russia and the condition is such as to cause great alarm. There have been over a hundred cases in Moscow, with many deaths, among the victims being Dr. D. Gorokhoff, professor of surgery and gynecology at Moscow University. The mortality rate from the disease is about seventy per cent.

New Hospital for Insane at Creedmoor.—Governor Miller has signed the McGinnies bill which provides for the construction of a new State Hospital for the Insane at Creedmoor, L. I. When this hospital is completed the Kings Park State Hospital will be set aside entirely for World War veterans suffering from mental diseases. The bill carries an appropriation of $2,979,782.

New Medical School for Western Reserve University.—The trustees of Western Reserve University, Cleveland, have accepted Samuel Mather's gift of sufficient money to build new medical school buildings which are to be the finest in the country. No amount is specified in the gift, but an architect's estimate places the figures at approximately $2,530,000. The work of construction will be begun in the spring.

Brooklyn Diagnostic Society.—The nineteenth scientific session of this society was held on Friday, February 3rd. Dr. Frederick M. Allen, director of the Psychiatric Institute, Morristown, N. J., delivered an address on How Shall We Feed Our Diabetic Patients? which was discussed by Dr. Max Kahn, Dr. Herman C. Mosenthal, Dr. Nellis B. Foster, Dr. Albert Arthur Epstein and Dr. Henry Rawle Geyelin.

Ophthalmological Clinic in Paris.—The Faculty of Medicine of Paris are offering a course in clinical ophthalmology at the Hôtel Dieu. Professor F. De Lapersonne, assisted by Dr. Hautant, otorhinologist of the hospital, and Velter, Prelat, Monbrun, chiefs of clinic at the laboratory, will direct the work. The course will begin on May 23, 1922, and will extend through June. Clinical examinations, practice operations and laboratory technic will be presented. A special certificate will be presented to the graduates at the end of the term by the Faculty of Medicine of Paris. Those wishing to secure further information should address the secretary of the Faculty of Medicine. The class will be limited to fifty members. The price of the course will be 150 francs.

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Died.

McClintock.—In Kansas City, Mo., on Thursday, December 29th, Dr. Charles S. McClintock, aged fifty-seven years.

Miller.—In Oakland, Cal., on Thursday, December 29th, Dr. Annie L. Miller, aged ninety-four years.

Miller.—In Alexander, N. Y., on Tuesday, January 10th, Dr. Joseph Butler Miller, aged seventy-eight years.

Miller.—In Millerton, N. Y., on Friday, January 13th Dr. Walter B. Miller, aged sixty-six years.

LONDON LETTER.

(*From our own correspondent.*)

London, *January 20, 1922.*

Influenza in Great Britain—International Congress of Otology to Be Held in Paris—The Spahlinger Treatment of Tubcreulosis—The Modern Treatment of Psychoses—The Doctor as a Health Instructor.

Influenza has been widely prevalent in many parts of Great Britain during the past few weeks—in fact it has been and still is epidemic. In commenced in the north of England early last month, in South Yorkshire and Derbyshire, gradually spreading northward to Durham and Northumberland and to Scotland and southward to London. It has subsided somewhat in the north of England, but is still rampant in districts of Scotland, especially Glasgow. At the present time there are few cases of influenza in the south and west of England and practically none in South Wales, although in some parts of Wales there are a great many cases. The latest report from Liverpool and neighborhood received by the Ministry of Health was favorable. So far as London is concerned, at the time of writing, there was no sign of a decrease in the influenza epidemic. For the week ending January 6th, there were 352 deaths from influenza in London, compared with 151 for the previous week. Incidentally, it may be mentioned that in the week ending January 14th, there were 3,156 cases of diphtheria and 4,556 of scarlet fever in the twelve hospitals of the London Metropolitan Asylums Board.

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The Tenth International Congress of Otology will be held in Paris from July 19 to July 22, 1922, under the patronage of M. Bérard, Minister of Education, and will be presided over by Prof. Pierre Sebileau. While termed a congress of otology, it will be practically a congress of otorhinolaryngology, as the proceedings will cover subjects of interest to those specializing in affections of the ear, nose, and throat. The following subjects will be discussed: 1. Abscesses of the cerebellum. 2. Otitic meningitis. 3. Value of the vestibular tests. 4. Syphilis of the ear. Reports on these subjects will be presented by Professor Schmiegelow, of Denmark; Professor Gradenigo, of Italy; Professor Buys, of Belgium; Professor Quix, of Holland; Dr. Hennebert, of Belgium; and Dr. Hinojar, of Spain. All these reports will be printed and published before the opening of the congress. One session will be devoted to a discussion of the surgical and radiative treatment of cancer of the larynx; that is, by x rays and radium. The mornings will be devoted to visiting various hospitals, where may be seen otorhinolaryngological operations, clinics and pathological specimens, and surgery of the head and neck. Dr. A. Hautant, 28, rue Marbeuf, VIII, Paris, is the general secretary to whom all communications should be addressed.

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Dr. H. Spahlinger, who has been for some time in the public eye as the professed discoverer of a cure for tuberculosis, contributed a paper to the *Lancet,* January 7, 1922, in which he described his theory of the manner in which tuberculosis may be treated successfully. Although his principles of treatment were to some extent explained, no new light was thrown upon the real nature of his preparation. As Dr. Lyle Cummins, professor of tuberculosis, Welsh National School of Medicine, Cardiff, writes in a letter published in the *Lancet,* January 14th, Dr. Spahlinger's "possible immunization" theory depends entirely upon the validity of his claim, clearly expressed in the paper quoted, that "the different symptoms of intoxication are due not to varying manifestations of the same toxin but to different toxins, each of which is separately used in the preparation of a "partial serum." He must have devised special methods of his own to isolate these alleged toxins, and these methods must, if sound, be capable of successful application by other competent workers if full details are published.

Before it is possible to decide as to the validity of the claims made for the antitoxins advocated by Dr. Spahlinger it is necessary that full information should be forthcoming. Dr. Cummins holds that the essential questions that must be answered before it is possible to form any idea as to the Spahlinger antisera are briefly as follows: 1. Upon what experimental evidence is it claimed that ectoxins are formed or have been isolated from the germ in question, or, in the case of endotoxins, that they have been separated in an available form for the production of antisera? 2. Have the antisera been standardized? If so, what is the method of standardization of the toxins and antitoxins, and upon what unit is the dose based. 3. What is the exact technic employed in the preparation of each of the toxins and antitoxic sera used? 4. Against how many toxins have partial sera been prepared, and under what circumstances are these sera selected for use in individual cases? It is absolutely a reasonable view to take of the Spahlinger claims that much more should be known of the methods whereby these claims are said to be fulfilled ere the medical profession advocate or even seem to regard with favor this treatment. No practical conclusions can be drawn from the few cases quoted in the *Lancet,* and it appears absurd that on such records the lay press has lauded the Spahlinger treatment to the skies—indeed, on some occasions hailed it as a certain cure for tuberculosis. The discoverer, socalled, of this latest means for treating tuberculosis appears thoroughly to understand the value of advertising, while the medical profession awaits enlightenment as to the nature of the work upon which this widely heralded treatment is based. Until further and more definite details are given the medical profession will rightly remain skeptical as to the validity of the claims so boldly advanced.

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At a meeting of the Section of Psychiatry of the Royal Society of Medicine, held in London on January 10, 1922, Dr. R. G. Rows read a paper on the application of modern methods in the treatment of psychoses. The speaker said that he could give only a superficial sketch of the subject, but wished to say a few words on it, because of the great attention which had recently been bestowed on psychoneuroses. Between these two conditions there was not yet evident any basis for a scientific distinction, though an American author had declared that in the cases of psychoses there was more trouble with the policeman than with psychoneurosis. He pointed out that it was important to recognize that all mental illnesses existed a considerable time before there were outward manifestations of them. By mental illness, he meant a disturbance of ordinary mental activities, such as perceiving, thinking, feeling, judging, giving attention, assessing values, etc. The basis of all mental illnesses, whether psychotic or psychoneurotic, was a disturbance of these normal faculties. The evidence was a failure of the patient to adapt himself to outside surroundings. A paranoic subject might cause surprise by the liveliness of his interest in events, in literature and music, yet paranoia was one of the most dangerous of the psychoses. From the viewpoint of the conventions the behavior of these subjects was irrational and antisocial; but from the biological point of view it would be more difficult to apply the term "irrational"; the fact was that these people were reacting to a definite stimulus. Even general paralysis might be simulated by a patient with a psychosis. An interesting type was that showing symptoms of a psychoneurosis at one time, and of a psychosis at another. Symptoms in themselves were not of much real value in understanding a mental case. Freud advised that symptoms should be regarded merely as directing posts, indicating what would be the profitable lines of investigation. Symptoms enabled a case to be put into a category and left there but not to be understood.

Dr. Rows emphasized the point that it was impossible to understand a mental illness by a consideration of only the psychic side. From every experience which crossed the threshold of consciousness there resulted intellectual appreciation of the fact, an emotional reaction, a physical reaction, and in the latter all the organs of the body might be concerned. If this latter fact could be impressed on patients, much of the dread arising from their physical condition would disappear. Acute fear was known to be capable of disturbing practically every organ of the body. A disturbance of some of the endocrine glands might alter the activity of the central nervous system, so that a stimulus which normally had no apparent effect would, in the presence of such disturbance, cause a reaction, or even an overreaction. Intoxications and fatigues might weaken the control which normally enabled the reactions to be kept within limits. The lesson was that not only the mental content of these conditions had to be considered, but also the nutritional and other body changes. To understand these mental processes it was necessary to study the organism as a whole. It would be seen that physiology could explain much that up to the present had been obscure; the organism must be studied from the biological and anthropological viewpoints, for that would give a more hopeful outlook in the treatment of these mental conditions, especially if they were dealt with at an early stage.

In the discussion that followed Dr. Percy Smith referred to cases of psychosis which were of sudden onset, such as those following severe shock, and questioned whether a long antecedent event could be held responsible for these. He felt sure that there were instances in which the trouble was obvious to an observer, but the patient himself was unaware of it. He fully agreed that many war cases were saved from certification and seclusion by having hospital accommodation and treatment available at the time of their breakdown. The spending of much time in attempting to reveal the original trouble was well justified, but if that were to be attempted systematically in all the county hospitals, it would mean the employment of a prodigious staff. He thought delirium tremens could be looked upon as insanity produced by an intoxication. Many cases of psychosis did not react well to psychoanalysis, but every uncovering of essential facts left the patient more comfortable.

Dr. Stamford Read agreed that alcohol alone did not cause a psychosis; there must be, in addition, something which brought about a mental conflict. Dr. Rows, in the course of his reply, agreed as to the importance of childhood influences in these cases, remarking that many cases of psychosis would not be understood without inquiring well back into childhood. Remorse presupposed a high moral state, superior to that possessed by the ordinary child. He admitted that alcohol could so disturb the control as to alter the relationship to old associations and allow undesirable memories to become obtrusive. He had found a great help in teaching the patient something about his mental mechanisms, for this enabled him better to adapt himself to his environment.

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At a meeting of the Glasgow University Medico-Chirurgical Society, held on November 24, 1921, Sir Napier Burnett, M.D., director of hospital services of the British Red Cross, delivered the presidential address. He urged that medical practitioners should become teachers of health as well as physicians in disease. What was needed by the public, and was indeed being in a measure asked for was a fuller knowledge of the principles of physiology in the maintenance of health. The practitioner was the individual equipped with that knowledge and best fitted to impart it to those in need. The speaker illustrated his ideas by reference to the success of health propaganda in America, both on the part of voluntary agencies and as a commercial proposition. In his view the apostolic injunction that "they that be whole need not a physician, but they that are sick" should, in the light of present day knowledge, be modified; the whole need the physician of health, and the sick the physician of disease. Formerly, unless in the case of clubs or societies and in later days under the National Insurance Act, the family doctor derived his income from those who consulted him in the hour of sickness and his income necessarily fluctuated with the prevalence or absence of disease. With the advent of the Insurance Act his income had become more stable, as now he derived more of it from those who were well than from the sick. In furtherance of this idea, the speaker advocated some scheme whereby a rate of remuneration could be devised for services to clients who, though not ill, desired instruction in health matters. In some parts of the country, in former days, the family medical attendant contracted to look after a family in health and sickness during the year for a fixed sum, and this system was now in vogue in Sweden.

Book Reviews

THE HEART IN PREGNANCY.

Heart Disease and Pregnancy. By Sir James Mackenzie, M. D., F. R. C. P., LL. D. (Edin. and Aberd.), F. R. S., Director of the Institute for Clinical Research, St. Andrews. London: Oxford Medical Publications, 1921. Pp. 138.

Sir James Mackenzie shows that the important subject of cardiology has been neglected in the works of most obstetrical writers. They have presented the older views in a somewhat hasty, sketchy, unimportant fashion, so the reader finds it difficult to coordinate his obstetrical knowledge and the cardiac condition of the patient.

First, Mackenzie takes us through the normal phases and physiological changes which occur in the vascular apparatus during pregnancy, then the changes in an affected heart during the same cycle. He brings out many popular misconceptions which have been held in regard to the vascular adaptability under these stressful conditions. Then each variety of heart disease is taken up in turn and discussed in its bearing on pregnancy. Certain cardiac conditions which are inimical to pregnancy are discussed and rules are formulated for the cases in which pregnancy should be forbidden. The earliest minor symptoms of vascular disease should receive prompt attention from the obstetrician.

The book is written in Mackenzie's usual lucid convincing style and should be widely read by obstetricians and cardiologists.

GASTROENTEROLOGY.

A Manual of Diseases of the Stomach. By William MacLennan, M. D., Honorary Consulting Physician to Western Infirmary Glasgow, Glasgow Royal Maternity and Woman's Hospital, Glasgow, etc., with the Assistance of J. Salisbury Craig, M.B., Ch.B., Extra Physician, Outdoor Department, Western Infirmary. New York: Longmans, Green & Co.; London: Edward Arnold, 1921. Pp. x-392.

This book deals with the diseases of the stomach as well as of the intestines, gallbladder and pancreas, which are met in everyday practice. It would seem that the author has covered his field conscientiously, and with the thoroughness of an experienced teacher has presented his subject in a lucid style, devoid of the ponderousness and theoretical consideration of more extensive works.

The preliminary chapter deals with the anatomical structure of the gastrointestinal tract, its physiology and chemistry. This is followed by a discussion of the methods of history taking, and the value of signs and symptoms in connection therewith are strongly emphasized. The diseases of the oral cavity, esophagus, stomach, gallbladder and pancreas are taken up in succession. A detailed description of the methods of analysis of gastric contents, vomitus and feces is given. The various tests in current use are described and their respective values in diagnosis logically considered.

In this connection one cannot help but observe the not infrequent tendency among foreign authors to pass over rather sketchily work done in this country. Some evidence of this appears in this book, where, for example, only a short paragraph is devoted to the fractional method of gastric analysis introduced by Rehfuss, and which has, in a good many institutions, entirely superceded the old Ewald or Boas test meal. Likewise nothing is mentioned of the Meltzer-Lyons test in the diagnosis of gallbladder diseases, also evolved in this country. Aside from considerations such as these, the particular merit of the work lies in the broad attitude of the author in analyzing the diseases of the gastrointestinal tract, not only from the point of view of the specialist, but always bearing in mind their relationship to general systemic conditions, where the stomach symptoms may be but one link in the chain of a constitutional disease, or that of the heart or lungs. This should, indeed, commend itself to the general practitioner. The manual on the whole proves to be a worthy addendum to the library of any practising physician.

CARDIAC DISEASE AND THE NORMAL HEART.

Original Observations and Theories on Cardiac Disease and the Normal Heart. With a Note on Alcohol. By Michael B. Shipsey, M. B., B. Ch. (Birm.). Birmingham: Cornish Brothers, Ltd. Pp. 40. 1*s.* 3*d.*

A small book with many pretentious assertions. Many ideas are presented, but the support they receive is inadequate to convince the general practitioner. The cardiologist will surely take exception to many of the author's statements, even though they are made with emphasis. This should not concern Dr. Shipsey, for he takes little heed of many of the scientific findings of cardiology. His views are more or less temperamental, yet set forth in a dogmatic fashion.

LIFE INSURANCE EXAMINATIONS.

Medical Examination for Life Insurance. By Thomas D. Lister, C. B. E., M. D., F. R. C. S., M. R. C. P., President of the Assurance Medical Society; Medical Officer of the Royal Exchange, Friends' Provident, and North British and Mercantile Offices; Physician to Mount Vernon and Royal Waterloo Hospitals. London: Edward Arnold & Co.; New York: Longmans, Green & Co., 1921. Pp. viii-168.

This little volume treats only of the application of medicine to the business problems involved in life insurance. The author has placed himself in the imaginary position of a medical insurance examiner faced with the duty of filling up a blank form with data derived from a hasty examination of the prospective purchaser of insurance; and he aims to assist the chief medical officers by helping to collate the data in such a manner as will do justice both to the applicant and the insured.

The thirty-five chapters into which the volume is divided are full of interest, not only to an insurance examiner, but to a layman as well. The book is written in a breezy, colloquial style, which makes one forget that he is reading a purely scientific work.

One may conclude after a careful reading, that there is no such thing as an average risk. The author finds it difficult to make this definition, but compromises by saying that it is "one which presents positive evidence in the family and personal history, examination, occupation, and habits, of being a life that has a normal expectation period." The author believes that no examiner should be asked anything more than whether he considers the applicant to be insurable at ordinary rates, and if not, to give his reasons. It is the duty of the head office to pass finally on the question.

"Take all you can and reject all you must," seems to be the view of present day insurance men. This policy is based on the obvious fact that if the volume of business coming to an insurance company is very large, the loss which will fall on the mass of insurers by the inclusion of some doubtful risks, becomes small. On this basis, any person of fairly good physical habits and constitution, with nothing that points to early deterioration of a serious character, is acceptable to the insurers; if the applicant is somewhat below par, with apparently healthy lungs and kidneys, he is still acceptable if he pays a slightly higher premium; it is only when there is distinct evidence of organic disease, that rejection follows. As regards the urine examination, it is essential to establish the absence of albumin, and Esbach's test is recommended for this purpose, as a negative test. Recent syphilis, however well treated, implies an extra risk, and late syphilis implies an under average risk that must be compensated for by a higher premium rate.

The author has made no attempt to teach physical signs nor has he included the mortality tables that are so familiar in books on life insurance; but there are excellent chapters on medical and physical conditions that have a decided influence on the insurability of the applicant. As stated above, the volume is one that must be of interest not only to the insurance examiner but to the average physician and even to the layman interested in insurance.

A TEXTBOOK OF DERMATOLOGY.

Diseases of the Skin. A Practical Treatise for the Use of Students and Practitioners. By OLIVER S. ORMSBY, M. D., Professor and Head of the Department of Skin and Venereal Diseases, Rush Medical College (In Affiliation with the University of Chicago); Dermatologist to the Presbyterian, Saint Anthony's, and West Suburban Hospitals, and the Home for Destitute Crippled Children. Second Edition, Thoroughly Revised. Illustrated with Four Hundred and Forty-five Engravings and Four Plates in Colors and Monochrome. Philadelphia and New York: Lea & Febiger, 1921. Pp. xiv-1166.

Notwithstanding the growth of our knowledge of skin diseases within the past decade, the author has succeeded in presenting a highly interesting and serviceable textbook covering this extensive subject within the confines of a single volume of some eleven hundred pages. This second edition has been rewritten in large measure to provide for new material covering fifteen new diseases of the skin, and for the recent progress in dermatological literature.

The author has succeeded, as few dermatological writers do, in placing before his readers a treatise that any one can understand without recourse to other books for assistance; the book being intended for students and general practitioners, it therefore meets a most essential requirement in this respect. The student will find this work far less confusing and difficult of mastery than other works that have made their appeal to him. The illustrations really illustrate, but it is unfortunate that so few of them are in natural colors.

The teachings are conservative and modern in the last degree. Under the head of general therapeutics, the author discusses rather fully the newer therapeutic measures, such as radiotherapy, light therapy, radium, and electrolysis, giving each of them its recognized value in dermatology. The subject of syphilis is treated rather briefly, compared with other writers on the skin, but the student will derive much that is useful from this part of the work. The Wassermann test is rightfully set down as confirmatory, rather than as an absolute proof of syphilis, and the luetin test is recommended as being more useful in late and latent periods of the disease than the Wassermann test. Eczema is treated thoroughly along the usual conservative lines; radiotherapy is mentioned as being of value in the so-called trade or professional eczemas, but no mention is made of its possible dangers.

On the whole, the author has produced an exceedingly useful volume, one that will prove valuable to the student and the practitioner interested in dermatology.

VENEREAL DISEASE CONTROL.

Vice and Health. Problems—Solutions. By JOHN CLARENCE FUNK, M. A., LL. B., Director, Bureau of Protective Social Measures, Pennsylvania State Health Department. Philadelphia and London: J. B. Lippincott Company, 1921. Pp. 174.

The author gives evidence of an unusually sane outlook on the problems of prostitution and the venereal diseases. It is refreshing to read in a book of this kind that the lasting advantages of various forms of attack by reformers, clergymen and others "have been slight." Usually such authors believe, and they lead their readers to believe, that all that is required to eliminate prostitution and venereal disease is to "clean up" the red light district, close up the saloons, and change the head of the police force. They usually are totally blind as regards the existence or activities of the clandestine or "charity" offender, but the present writer seems to understand her quite well and attaches considerable importance to her as a disseminator of venereal disease.

Social workers who aim to eliminate venereal disease by closing red light districts will read with alarm and possibly surprise, that "a score of red light districts thus closed, while undoubtedly affecting the element of ready marketability and diminishing to a certain extent exposure to infection, does not in any real way lower the disease incidence." Coming from so eminent an authority on this subject, such a statement should cause many a worker in this field to sit up and take notice. Again: "The fact must not be overlooked that individual prostitution as found in hotels, assignation houses, automobile activities and the more recent roadhouse developments, carry with them as large a disease burden as the district itself."

It is encouraging to read such statements in a book on vice. They constitute an unmistakable evidence of the fact that honest students of this problem are beginning to give actual values to conditions that exist, but do not fit quite snugly into their program. It is, therefore, a pleasure to commend the present little volume for its sanity and courageous admissions.

However, the author is not quite so happy in his solutions as in his presentation of the underlying conditions. He recognizes that "a tremendous amount of education must be applied to enforce drastic laws on prostitution." Substitute the word "prohibition" for the word "prostitution," and the reason for this difficulty at once becomes apparent. When any community is ready to suppress prostitution and quit drinking, of its own free will and accord, drastic legislation will not be necessary, and until that community shows its willingness to give up these vices, all the legislation in the world will not suppress them. But the reformers have not yet learned that laws are made for the law abiding. Repressive legislation creates the clandestine prostitute and the bootlegger; both are the result of the popular reaction against the legislative attack on the personal liberty of the individual.

But in his zeal for the elimination of prostitution and the venereal diseases, the author quite forgets himself and plunges bodily into the ranks of the reformers, whom he himself would ignore. Urging quarantine for the venereal prostitute, he believes that "being thus detained and liberty taken away, the patients are made to appreciate to their sorrow that here is an instance where the shyster lawyer, bail and even habeas corpus proceedings are absolutely impotent." What is the Constitution among vice crusaders? We were of the opinion that we were guaranteed the right of habeas corpus at all times except under martial law; evidently the capture of a diseased prostitute and her imprisonment in jail are of far greater importance than such little matters as the right of habeas corpus or the Constitution itself.

And finally, the author concludes: "If citizens will look upon their town as a corporation in which they have a special personal interest, and elect worthy representatives on the planks of righteousness, efficiency and economy, the elimination of vice and its attendant evils will speedily ensue." To which we prayerfully add, Selah! But we don't believe it.

NURSING IN EYE CASES.

The Care of Eye Cases. A Manual for the Nurse, Practitioner and Student. By Robert Henry Elliot, M. D., B. S. (Lond.), Sc. D. (Edin.), F. R. C. S. (Eng.), Lieutenant Colonel, I. M. S. (Retired); Late Superintendent of the Government Ophthalmic Hospital, Madras, and Professor of Ophthalmology, Medical College, Madras; Lecturer in Ophthalmology, London School of Tropical Medicine, etc. With One Hundred and Thirty-five Illustrations. The Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton, 1921. Pp. xii-172.

This is an unusually good book on the nursing of eye cases. The writer says that it will be of little aid in passing examinations, but hopes it will be of help in dealing with cases in the sick room, and this is a very important thing. Ten pages, for instance, are devoted to drops, not only the drugs employed and their effects, but how to sterilize them and how to instill them. The condemnation of ordinary glass droppers with rubber teats as not hygienic is very just, but these droppers are likely to continue more popular than the dropper bottles he recommends because they are convenient. Furthermore, the technic of using the ordinary dropper properly seems more simple. A drop falling from a height on the eyeball startles the patient, and two inches would seem a considerable height, yet the bottle must not be held so near as to touch the eye or to be splashed when the drop falls, and the author recommends two inches as a good distance. With an ordinary dropper a drop can be laid in the *cul de sac* when the lower lid is pulled down without being dropped even half an inch. Under remedial measures are excellent instructions how to apply fomentations, to irrigate the eye, to apply ointments, and how to massage. Good instructions are given in regard to preparations for ophthalmic operations and the aftercare of the patients, but probably every surgeon would wish to modify a detail here and there. Then follow brief descriptions of various diseases and, in an appendix, the instruments required for various operations are given. The more carefully one reads this book, the more impressed he becomes with its many excellent features.

SURGICAL CLINICS.

The Surgical Clinics of North America. New York Number. Volume I, Number 6. Including Complete Index to Volume I. With One Hundred and Twenty-two Illustrations. Philadelphia and London: W. B. Saunders Company, 1921. Pp. 295.

The last number of the 1921 *Clinics* maintains the usually high standard set by the preceding numbers, and completes the first volume of over 1,800 pages of unusually interesting surgical material. The outstanding features of this New York number are the clinics of Lilienthal and Neuhof, the latter's clinic being devoted to surgical operations on the spinal cord and brain.

In reviewing these clinics bimonthly, we have repeatedly said that they serve a most necessary purpose in bringing to the reader a vast amount of clinical material, beautifully prepared, finely and even copiously illustrated, thus even surpassing in practical value the personal attendance at the operating theatre. One can forget what he saw and heard in the operating theatre, but with the *Surgical Clinics* on his library shelves, he has in an enduring form, always at his command, a constant reminder, a permanent record of hundreds of surgical clinics, at the hands of the most skilful surgeons.

TRUTH AND BEAUTY IN PSYCHOANALYSIS.

Wahrheit und Schönheit in der Psychanalyse. By Dr. Oskar Pfister, Pfarrer in Zürich. Zürich: Rascher & Cie, Verlag, 1918. Pp. 143.

Pfister has here presented in briefer form certain facts in regard to psychoanalysis which he has elsewhere proved himself eminently fitted to present. His culture and training give him a broad background from which to view psychoanalysis. He speaks further from his own experience with it when he maintains that its end is beauty in the broadest sense because psychoanalysis is also occupied with truth. Neither beauty nor truth as Pfister uses them here are artificial or partial conceptions. Psychoanalysis comes forth as a scientific method out of a sterile psychological past and refuses to do less than follow facts however deeply they may lead, however wide their deviations or interrelations. Facts do not always present themselves in esthetic form. A courageous persistence in dealing with them may for a time appear as an unethical occupation with the forbidden. Psychoanalysis has therefore had to meet both an ethical and an esthetic reproach. It, however, presses on with an intellectual sincerity unsatisfied except with fact in all its relationships. The end is therefore to bring order out of such facts, harmony to the life in which they belong. Thus profoundly, comprehensively, psychoanalysis reveals itself as an esthetic, ethical and, by its manner of work, genuinely intellectual science. It finds beauty where alone it can be completely found, in the whole of truth. Pfister's thesis is clearly presented, it is richly supported by literary and clinical material.

PSYCHOLOGICAL DRAMATIC STUDIES.

Marga Rother. Dramatisch-psychologische Studie in drei Aufzügen. Von Leo Katz. Berlin: Atlantik Verlag, 1920.

The writer of this drama may be familiar with the terms of psychoanalysis, or he may not. He may be acquainted with the technical designations for the emotional complexes which underlie disturbances of behavior and make for unhappiness. Whether he has such technical knowledge or not he has a genuine appreciation of the profound disturbances of the love life which the emotional complexes represent. He can depict the terrific force of a sister's fixation upon her brother, the corroding character of such a love, its possibilities for tragedy in external catastrophe and in inner rupture for her herself. He knows its relation to a shut in life such as the girl leads and he correctly estimates her unsuccessful effort to escape the unconscious incest by transference to religion and to music. One could wish that others desirous of expressing the principles of the psychology of the unconscious would touch these profound factors as unobtrusively yet as certainly as this writer has done.

DEVELOPING OUR RESERVE POWERS.

Selfdevelopment. A Handbook for the Ambitious. By H. Addington Bruce, Author of *The Riddle of Personality, Nerve Control and How to Gain It*, etc. New York and London: Funk & Wagnalls Company, 1921. Pp. x-332.

This is another of those books which we lay down after a careful perusal and say, "If we could but live and think and do as this book teaches, how nearly perfect we could be!" The author shows in his own simple and unaffected style, how all of us can draw on our reserve powers for greater and better and nobler thinking and living. All normal men and women have this vast reserve of success winning powers to draw upon, but in our haste for the accomplishment of what seems near at hand we overlook the greater possibilities that lie just beneath the surface. Every man and woman can succeed in life, according to the author, by the use of these higher and unexplored powers. Those who have succeeded beyond the average have found the key to the secret chamber of their reserve mental powers, and have put them to practical use.

There is nothing in this book that has not been said before, but the author has placed his material at the disposal of his readers in a manner that is both interesting and instructive. The style is purely conversational and aims to convey the author's meaning with the slightest effort on the part of the reader. The result is a most satisfactory one, especially for the individual who requires some mental adjustment for his daily problems of life. A careful study of this little volume and a faithful adherence to its teachings, undoubtedly will serve in a great measure to bring about that strengthening and reinforcement of the potential powers within us that bring with them what we call success.

FOLKLORE IN FICTION.

The Sworn Brothers. A Tale of the Early Days of Iceland. Translated from the Danish of Gunnar Gunnarsson by C. Field and W. Emmé. New York: Alfred A. Knopf, 1921. Pp. 340.

History, folk lore, and archeology find a friendly and skilful interpreter in Gunnarsson. His Scandinavian tale is full of the wealth of museum records brought to life; a re-living of the vigorous days of the Vikings, a sympathetic portrayal of the simple philosophy of a plain-speaking people. Historical records are humanized, the appealing story of Leif the Lucky and the settling of Iceland gains added interest in this narrative form. Facts have been cleverly dealt with, and such a scientific study of life in Norway in early days opens a vista of the possibilities in vitalizing history. It is a story simple enough for the comprehension of the youngest reader, yet instructive and fascinating to his elders.

MODERN MARRIAGE.

The Briary Bush. A Novel. By Floyd Dell. New York: Alfred A. Knopf, 1921. Pp. 425.

The true story of a modern marriage, the mating of two infantile characters, the insistence upon freedom, and the phantasied curtailment of individuality is in accord with much of today's half baked thinking. Not many of us are far removed from childhood much of the time. Mr. Dell has shown the infantile reasoning processes of the statistically adult mind with psychological appreciation. In tune with the entire sweep of the argument is Felix Fay's lovableness, that helplessness before reality that has endeared him to many readers in a like dilemma. His artistic knees do not stiffen for a good many rather sickly sweet chapters. Reality is faced at last and we feel Felix and Rose Ann may ultimately attain the true freedom, adult independence and personality.

STUDY OF THE WAITRESS.

The Woman Who Waits. By Frances Donovan. Boston: Richard G. Badger, 1921. Pp. 228.

The life of the waitress is shown by one who entered into the life as a worker and made a study of actual conditions as she found them. It may be considered as a report of a social worker rather than as a novel. The form of presentation makes it more easy to read and does not prevent its use as a source book.

Practical Therapeutics

RECENT CHANGES IN THE TREATMENT OF THE CHRONIC CARDIAC PATIENT.*

By Harold E. B. Pardee, M. D.,
New York,
Assistant Attending Physician, New York Hospital; Associate in Medicine, Cornell University Medical School.

(*Concluded from page 117.*)

SYMPTOMATIC DRUGS.

The drugs used for the chronic cardiac patient are divided into two parts—digitalis and other drugs. The chief drugs besides digitalis that are found to be of use are veronal, the bromides, nitroglycerine, and, rarely, diuretin. Veronal is a satisfactory hypnotic if the patient is restless and sleepless at night. Three or five grains before going to bed will often be effectual. Sodium or ammonium bromide may be used for the same purpose in ten or fifteen grain doses, but they do not seem so effectual.

Bromides are useful, however, in the treatment of patients with an excitable mentality whose heart must be shielded from the blood pressure raising effects of mental strain. They are helpful also to many patients who complain of pain in the region of the apex beat, most of these pains having a more or less neurotic basis. For these purposes, ten or fifteen grains four times daily should be used at first, reducing the dose if possible when some improvement appears, or increasing it if there is no improvement after five or six days.

For the pains which are due to coronary artery disease—and these have for the most part a substernal situation or at least have a substernal component—nitroglycerine is a most useful agent. A tablet of one two hundredth grain should be dissolved in the mouth at the first suggestion of the onset of the pain or discomfort, and it can be repeated after ten minutes if it is not effectual. Larger doses than this have been recommended, but, except in a patient who has developed a tolerance for the drug, I have not thought that they were effectual in cases where one two hundredth grain had failed. It acts probably by relaxing the muscle of the wall of the smaller branches of the coronary arteries and thereby causing a better blood flow, either through the narrowed artery or through the anastomosing branches, to the part of the heart muscle that was anemic.

Theobromine sodiosalicylate (diuretin) has been recommended for constant use in these patients with narrowed coronary arteries in a dose of ten grains four times daily, because it dilates the coronary arteries. I have had little experience with this drug, but what I have had leads me to believe that it may help in warding off attacks of pain due to coronary artery disease; that is, after taking it the pains decrease in frequency and are brought on by less exertion because of the action of the drug. The value of a drug promising such results must always be a difficult question to decide.

Diuretin may also be useful in some of the chronic cardiac patients who have a slight amount of edema of the legs, present only at the end of the day. There are times when digitalis will not remove this edema, and yet diuretin will. I do not know any way of predicting, when the patient is first seen, whether or not digitalis will be effectual in removing this edema, but when it fails diuretin should be tried.

DIGITALIS.

Digitalis is of course the most used drug when any sort of circulatory insufficiency is present. One of the greatest advances in the treatment of heart disease has come through our more exact knowledge of the properties of this drug. In using digitalis at present there is not the former uncertainty of indication or of dose or of effect. We know that it is indicated whenever there are evidences that the heart muscle is failing to carry on the circulation properly. We know that it is contraindicated only when it increases the number of premature beats (extrasystoles) or slows the heart rate to less than sixty beats a minute, or when vomiting has made its appearance after sufficient doses have been given to produce poisoning.

Aortic regurgitation, increased blood pressure, myocardial disease, hypertrophy of the heart or the presence of an acute infection, have been suggested in the past on various theoretical grounds as contraindications for digitalis. We know now that in all of these conditions the drug exerts its strengthening action on the cardiac muscle contraction, for the effect on the contraction causes a change in the electrocardiogram which can be plainly seen. We know that each of the theoretical objections is nullified by the observed fact that in all of these conditions the proper administration of digitalis is followed by an improvement of the circulation.

THE THERAPEUTIC CONCENTRATION.

I believe that the most important fact about digitalis which has been brought forward is that, no matter how good the preparation we are using, there will be little or no effect upon the heart unless the drug reaches a certain concentration within the body. This may be called the therapeutic concentration. The situation is much like that of weighing a liquid in a spring balance which does not register less than ten pounds. There is no evident result from pouring in liquid until ten pounds have been put in, and then each pint that is added has its evident effect.

We know that in treating patients the best therapeutic results are obtained from an amount of the drug which is not far short of that which will produce toxic symptoms, so that it is necessary to give close to a toxic dose before we can judge the therapeutic efficacy of digitalis in a given case. A dose of five minims of the tincture three times daily would never allow the drug to reach a therapeutic concentration in the body, for the body is able to excrete or destroy as much as this each day (2). Such a dose, however, would be quite effectual in maintaining for at least two or three weeks a therapeutic concentration that had been already established by larger doses. The daily amount that is excreted or destroyed has been estimated to be about twenty-two minims of a tincture of average potency, but there are considerable differences between different patients in this respect, even when the same tincture is used with each (2). The problem for us to solve, then, is first to reach the therapeutic concentration without causing the unpleasant toxic symptoms of nausea and vomiting, and then to maintain the patient in this therapeutic stage of digitalis action.

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*Read before the Greater New York Medical Association, March 21, 1921.

We know that the total amount of digitalis necessary to produce a definite therapeutic effect varies from one patient to another, but we also know that it bears some relation to an amount equal to two minims of the tincture for each pound of body weight (2 and 3); that is, 300 minims for a patient of 150 pounds. Also, for each day that elapses while we are reaching the therapeutic concentration there must be added about twenty minims of the tincture to allow for excretion. The dose cannot, however, be figured mathematically on this basis, for individual patients differ somewhat both in their total dose per pound and in their daily excretion of the drug.

A PLAN OF ADMINISTRATION.

A plan which works very well is to give thirty minims three times daily for two days, on the third day thirty minims in the morning and at night, on the fourth day twenty minims morning and night, and continue with this dose until effects are noted. The reason for the long interval between doses is to allow each dose to be absorbed and to produce its effect before the time for the next dose arrives. If the patient weighs as little as 110 pounds, the doses for the first three days should be twenty minims instead of thirty. By using this plan of initial dosing the patient will be brought to the therapeutic concentration some time between the fourth and seventh day, which is soon enough when dealing with chronic cases.

The patient should be warned that the medicine will upset the stomach when too much of it is taken; that it will make him lose his appetite, or that he will feel nauseated after taking a dose, or may vomit, or may feel nauseated and perhaps vomit in the morning after breakfast. He should be told also that if any of these things happen it is an indication that he has taken a little more digitalis than he needs, and he must stop taking it at once. If the patient reports back to the physician on the fifth or sixth day of the treatment, or directly on noticing any of these signs of overdose, then there will never, from my experience, be any danger from this method of administration.

I have used this method, not only with intelligent people, but also with some rather unintelligent ones at the night cardiac clinic at the New York Hospital. I find that the intelligent patients will take the drug quite as they are directed. They usually stop when nausea or loss of appetite appears and rarely take enough to cause vomiting. The unintelligent ones, however, tend to make two mistakes. They stop prematurely because the bitter, unpleasant taste of the tincture causes a sense of disgust which they interpret as nausea, or they fail to appreciate the loss of appetite or nausea, and persist with the digitalis until vomiting results. I have had one or two clinic patients who kept on with the digitalis even after vomiting appeared, but the fact that they were told to return to the clinic on the seventh day served to prevent even these from doing themselves any more than temporary harm.

Having thus brought the patient to the stage of therapeutic concentration or a little beyond it to the toxic stage of digitalis action, it will be possible to maintain this concentration by a relatively small daily dose. The drug should be stopped until the appetite has been regained, and then two days more so that the patient will surely be free of the toxic effects. On resuming, a dose of twenty minims daily will be found to be very close to the patient's need. This can be given in one dose at night or as ten minims twice daily, whichever the patient desires, and should be continued for several weeks unless the patient again shows loss of appetite or some other sign of overdosing, or has ceased to show any signs of cardiac insufficiency upon ordinary exertion.

SYMPTOMS OF DIGITALIS POISONING.

I have spoken of loss of appetite, nausea and vomiting as if they were the only signs of digitalis poisoning. They are much the most noticeable ones, and usually appear in the order named, but coincident with or just before the loss of appetite there can be noted a peculiar mental depression, a feeling of weakness, or a loss of energy, or listlessness, very like that of mild seasickness. When the toxic point is reached slowly, as will be the case when the doses recommended for the fourth day and later are being taken, a careful physician will be able to recognize this if he happens to see the patient at the time, and he will be able to prevent nausea and vomiting by stopping the drug at this time.

Certain physical signs may also arise either at the same time as these symptoms or somewhat earlier, and since they constitute an undesirable action of digitalis, they indicate its stoppage. Both of these have already been mentioned as contraindications for digitalis, and they are first, the presence of numerous extrasystoles or of a heart rate less than 60 or 65 without extrasystoles, partial heart block, or auricular fibrillation being present. In certain patients digitalis increases the frequency of extrasystoles or causes their frequent occurrence. This is a sign of muscle irritability, so that if continued, the drug might be expected to cause ventricular tachycardia or ventricular fibrillation. The reason for discontinuing it is therefore plain.

Patients in whom there develops a very slow heart rate under digitalis usually have auricular fibrillation, and the slowness is due to the A-V block produced by the drug. Occasionally a slow heart rate will be produced when auricular fibrillation is not present, and then it is due to the effects of digitalis in heightening a tendency to A-V block that is due to disease of the A-V bundle. There is no real danger to the patient from continuing digitalis under either of these two latter circumstances, for they pass off readily when the drug is stopped and promptly under the influence of atropine, but when the heart rate is reduced as low as 60 a minute, the physician must carefully balance the possible benefit from the strengthening effect of digitalis upon the heart's contraction against the possible harm from the increased amount of energy that must be demanded of each of these 60 beats a minute to drive the same minute volume of blood which should normally take 75 beats. When the heart rate is less than 70 there is an uneconomical expenditure of the heart's force.

INDICATIONS FOR DIGITALIS.

Let us now consider the indications for digitalis in the patient with chronic cardiac disease. Most prominent of all indications is the diagnosis of auricular fibrillation, and I believe firmly that every patient who has this irregularity of the heart beat should constantly take enough digitalis to maintain a heart rate of less than 80 a minute while at rest. After the initial therapeutic concentration of digitalis has been reached in the body, this effect may be maintained by twenty minims daily of the tincture, more may be necessary, or as little as twelve minims may suffice. Whatever the dose may be, it should never be stopped, and should be controlled by the physician counting the heart rate, at first every week and later as the patient's individual dose is more closely approximated, every two weeks or four weeks or even at six week intervals. Without digitalis these patients, with rare exceptions, tend to have such a rapid ventricular rate that fatigue of the heart muscle sets in, with consequent failure of the circulation.

In patients without auricular fibrillation the indications for digitalis are of a different sort, and it is rare that the drug must be given continuously. I believe that digitalis is indicated with a regular heart whenever the patient experiences dyspnea on walking a distance of less than half a mile on level ground, or from any lesser degree of exertion. Such a patient is suffering from a moderate degree of cardiac insufficiency, and will be benefitted by the strengthening of the muscle contraction, which is one of the effects of digitalis. When the therapeutic concentration has been attained a dose of twenty minims daily should be continued after a day or two of stopping. With these patients we lack the guide as to therapeutic effect which is afforded by the rate of a heart with auricular fibrillation, so that we must depend entirely upon the symptoms of lassitude, depression and loss of appetite to indicate that an overdose is being given, and we have no feasible way of telling when we are using too small a daily dose. (The electrocardiographic record will show the characteristic effect on the T wave, but this is only a practicable way of controlling digitalis medication under very exceptional circumstances.) It is well, therefore, after two or three weeks of this dosage, if we have not noticed these signs of overdose, and if we have not obtained a satisfactory improvement of the symptoms of cardiac insufficiency, to increase the dose to twenty minims twice daily for a few days, watching carefully for the early indications of poisoning.

I believe that a seven or eight weeks' course of digitalis given in this way will improve the condition of the majority of cardiac patients who show signs of cardiac insufficiency on exertion, even though their heart beat is regular, and especially so if combined with a course of graduated exercise as has been outlined. Improvement should be followed by a period of rest from treatment, and if the symptoms should return, the treatment should be resumed. We are dealing with patients who have a chronic disease, and periods of treatment alternating with periods of rest, both for the physician and the patient, are always productive of better results than to attempt a continuous supervision which will almost certainly fail to be carried out.

SUMMARY.

I have tried to make clear the present conception of the importance of reinfection of the heart as a cause of attacks of decompensation and the measures we should take to avoid reinfection.

The importance of cardiac overstrain in causing cardiac insufficiency is also mentioned.

I have pointed out how we can form an estimate of the patient's ability to perform exercise, and how we should use this estimate as a basis for limiting his activities and for a course of treatment by gradually increasing exercise.

The diet has been briefly considered, and also the use of certain drugs for symptomatic relief.

The present idea in regard to digitalis therapy are discussed, and a plan suggested which is designed to carry out these ideas in a way that will be of most benefit to the patient.

REFERENCES.

1. Barringer, T. B.: The Treatment of Cardiac Insufficiency by a New Method of Exercise with Dumbbells and Bars. *Archives of Internal Medicine,* 1915, xvi, 795.

2. Pardee, H. E. B.: Notes on Digitalis Medication. *Journal A. M. A.,* 1919, lxiii, p. 1822.

3. Eggleston, Cary: Digitalis Dosage. *Archives of Internal Medicine,* 1915, xvi, p. 1.

74 West Forty-eighth Street.

A FEW PRACTICAL HINTS IN ANGINA PECTORIS.

By H. Rabinowitsch, M. D.,
New York.

Much has been written on this subject and I do not expect to add much that is new; still I think that the reader will find here a few important hints, especially in the etiology and prophylactic treatment of this affection, which have been neglected or overlooked. Angina pectoris is considered by many as a rare disease; this is quite erroneous; the explanation for this error lies in their definition of this affection as a "paroxysm of agonizing pain, often with a sensation of impending death," etc. In severe forms it really comes to paroxysms of that kind, but in the majority of the milder cases there is only an almost constant feeling of oppression in the chest and some dyspnea with a slight precordial pain and a sense of distress and uneasiness. Cases of this type are not rare and are often mistaken for some gastric disorder. This feeling of oppression is in all probability, despite all the different theories, due mainly to some lesion of the coronary arteries, which is one of the most common pathological findings and in which area the feeling is usually located. They are usually obstructed or obliterated in a varied degree (therefore the severe and milder forms of angina pectoris) and so interfere with the nutrition of the myocardium. Therefore we find myocardium degeneration or enfeeblement of the heart muscle from poor nourishment in a great number of cases.

COMPLICATIONS OF ANGINA.

That there may be complications, either in consequence of the pathological changes in the coronary arteries (as Nothnagel's ischemia, or myocardial disease) or caused by the same etiological factor—is easy to conceive. It is therefore not surprising if, beside the coronary changes, we often find some other pathological changes in that region, as mitral stenosis, thrombosis or pericarditis. There is no necessity to consider such findings as a reason for different theories.

The complications of angina that I have seen were: hypertrophy, myocardial diseases, and frequently aortic trouble, especially insufficiency. General arteriosclerosis was rarely present in my cases and the blood pressure was usually normal and angina pectoris is therefore not to be considered as a disease of the aged. On the contrary, it is more of a disease of the middleaged, and most of the fatal cases are reported in the fifties, which is in accord with my own experience. True angina pectoris is much more prevalent in men than in women. In women it is usually a part of general arteriosclerosis. It is much more frequent in the socalled better classes, professional people, especially physicians. John Hunter, Nothnagel, Charcot, and William Pepper were some of the victims of this malady.

ETIOLOGICAL FACTORS.

In the majority of the cases, in my opinion, tobacco is responsible for this affection, although alcohol and to some degree coffee are also etiological factors. Further I often found lead as the cause of the affection in a number of cases of painters and printers. Red meats may be a cause of angina pectoris by creating a general gouty condition. Typhoid, influenza, rheumatism, gout, diabetes and syphilis are important factors.

Five important factors are to be considered as exciting causes of both severe attacks and the feeling of oppression of the milder form: 1, The surrounding temperature being too hot or too cold; 2, gastrointestinal disturbances, improper food, overloading the stomach, constipation; 3, muscular effort of any kind, rapid movements, especially facing the wind causing dyspnea and frequent contractions of the degenerated or enfeebled heart muscle; 4, mental emotions, worry, excitement of any kind, annoyance, etc.; 5, irrational or uncomfortable dressing, tight clothes and stiff, narrow collars. All of these may bring on an attack of a severe or mild form. I want to emphasize that socalled mild attacks, or feeling of oppression without the agonizing pain, have more often proved serious and even fatal than the severe attacks. This the physician should always keep in mind.

I lay much stress on the etiology, as it gives many important hints for the prophylactic treatment and also often has a curative effect.

REST AND EXERCISE.

The treatment should begin with rest, if possible, in bed; the patient should have at least ten hours sleep a day. We all know that rest, especially sleep, is supposed to have a regenerative influence of nutrition on cell life or cell energy, converting the nutritive elments into cell life or cell energy. Rest often suffices to restore the voluntary forces of the body. After a rest of about ten hours the patient, while still in bed, often feels so well that he thinks that he is well, but soon he finds, in getting up a slight transient dizziness. Later moderate exercise proves to be beneficial. (Nauheim treatment.) The patient should take walks twice a day, about one hour at a time, with a little rest after each half hour's walk. He should not walk fast, or face a strong wind, and should take deep breaths (preferably through the nose, aiding by the mouth, if necessary, in the expiration) when he feels some slight oppression, dyspnea, or slight dizziness. The clothes should not be tight, or interfere with free breathing. The patient should not wear any belt for the same reason, nor should he wear stiff, narrow collars. A soft wide collar is best, especially in the summer. The hat or cap should not be tight neither nor heavy.

CLIMATE.

A moderate climate is most suitable in angina. The patient should go to Florida for the winter if he can afford it; otherwise on very cold days he should stay in doors. The temperature of his room should be moderate, comfortable, not overheated. He should be warmly dressed, especially about the chest and neck. In summer his clothes should be light and comfortable. The seashore has been warmly recommended; otherwise on hot days he should stay indoors or sit in a shady place. The head may be lightly covered or remain uncovered.

DIET.

The patient should avoid red meats with the exception of a small piece of boiled meat occasionally but no roast meat. White meats are preferable, but also boiled. The main diet should be vegetarian. Plenty of vegetables and cooked fruits (grapes do not agree with many); plenty of cream and butter (no other fats). He should not eat too much at a time. Half a teaspoonful of bicarbonate of soda after meals for about two weeks may aid in alkalinizing the blood. Half a glass of hot water with a little milk and some sugar to be drunk slowly and hot liquids in general, are also believed to do good. Stomach and bowels should be kept in perfect condition and care should be taken that the bowels should move freely. Epsom salts should be used especially when lead poisoning is suspected. The patient should live a quiet life, avoid excitement of any kind, worry and muscular exertion. Tobacco and alcohol should be prohibited; coffee may be taken moderately.

MEDICAL TREATMENT.

The medical treatment in the severer form of angina pectoris during or after the attack is the usual; in the mild form potassium iodide for some time. Occasionally digitalis may be necessary; otherwise the hygiene and dietetic measures are sufficient in most of the mild cases to bring about considerable improvement in the patient's condition.

432 WEST THIRTY-FOURTH STREET.

Pulse Rate and Blood Pressure Responses of Men to Passive Postural Changes.—Max M. Ellis (*American Journal of the Medical Sciences,* April, 1921) thus summarizes his paper: 1. In general tilts elevating the head gave a rise in pulse rate, a fall in systolic pressure and a rise in diastolic pressure, and those lowering the head a fall in pulse rate, a rise in systolic pressure and a fall in diastolic pressure. The conspicuous exception to these responses was the reclining to head down tilt in which the largest percentage of cases gave a fall in pulse rate, a fall in systolic pressure and a rise in diastolic pressure. 2. The individual data showed that only a little over one third of all cases gave the three responses in pulse rate, systolic and diastolic pressures expected from the mass data, simultaneously. 3. Tilts from reclining to head down forty-five degrees and return gave the least constant responses of all the tilts used. 4. The tilt from reclining to head up forty-five degrees produced almost the same degree of responses as the tilt from reclining to standing. 5. With the exception of the tilts in the head down to reclining quadrant the responses given to any tilt were offset by approximately equal opposite responses when the tilt was reversed. 6. The initial and final positions of the subject had more effect on the degree of responses following a tilt than did the distance traveled by the subject during the tilt.

Diagnosis of Myocardial Disease.—Harold E. B. Pardee (*New York State Journal of Medicine,* August, 1921) gives the following as the symptoms which appear with myocardial disease: 1. An increased tendency to fatigue, the patient tires more easily than usual. 2. Shortness of breath appears on a degree of exertion which previously did not cause it. 3. Precordial pain appears upon exertion or even while at rest. 4. Edema is found about the ankles, perhaps only at the end of the day. 5. There may be slight cough of long standing—a chronic cough.

The physical signs which result from this condition are: 1. Enlargement of the heart is common. 2. Irregularity of the heart action is frequently found. 3. The first heart sound often has a sharp or valvular quality losing its prolonged running character. 4. The apex beat is weak and diffused instead of being definite and circumscribed. 5. A systolic blowing murmur may be heard at the apex of the heart, due to a relative insufficiency of the mitral ring. 6. A gallop rhythm may be produced in the sounds at the apex. Of late the electrocardiogram has been added to our armamentarium and should serve to reduce the large percentage of error found by Cabot in the diagnosis of myocarditis. The older methods of palpation, percussion, and auscultation, sometimes aided by the x ray, must still be practised, but a series of examinations makes the writer feel safe in saying that when a heart gives a normal electrocardiogram, when it does not show therein any of the recognized abnormalities, then there is but very little disease of the ventricular muscle. This is in accord also with clinical experience, for it is uncommon to find a patient with symptoms of cardiac insufficiency who does not have either an abnormal electrocardiogram or other signs such as valvular disease or high blood pressure.

Treatment of Auricular Fibrillation by Quinidin Sulphate.—C. C. Wolferth (*American Journal of the Medical Sciences,* December, 1921) discusses the effects produced by quinidin in twelve cases of auricular fibrillation. The normal rhythm of the heart was restored in seven, the fibrillation was converted to flutter in one, and was not abolished in four. In 147 cases collated from European sources and 16 from this country, including the 12 just mentioned, a total of 163, the normal rhythm was restored in 83, a percentage of 51.5. The duration of the normal rhythm thus obtained has been for the most part temporary. Studies of the physiological action of quinidin have shown that it is a cardiac depressant influencing chiefly the functions of contractility, excitability, and conductivity. Quinidin therapy is still in the experimental stage. If it is used there must be a careful selection of cases and constant observation during the course of treatment.

Factors Modifying the Duration of Ventricular Systole.—Louis N. Katz (*Journal of Laboratory and Clinical Medicine,* March, 1921) determined the temporal variations of the cardiac phases in dogs with normal circulations from optical records of the heart sounds. He found that under natural conditions diastole was more variable than systole. The duration of diastole depends mainly, but not entirely, on vagus tonus. The variations of systole bear no constant relation to the preceding diastole, being even less affected than diastole by the vagus tonus. The conclusions reached as a result of this study are: 1. The duration of systole is normally modified to a large extent by the heart rate according to a uniform cardiac action conception, such as Henderson presented. 2. Other influences, however, for instance, alterations of arterial resistance and venous pressure, the specific action of the accelerator nerves and those occurring during changing heart rate and even naturally from beat to beat, are capable of producing deviations from this uniform action in an animal with a normal circulation.

Influence of Thyroid Products on Production of Myocardial Necrosis.—Ernest W. Goodpasture (*Journal of Experimental Medicine,* October, 1921) used rabbits free of infection in this investigation, to determine what demonstrable effect feeding desiccated thyroid gland, or intravenous administration of crystalline thyroxin, would produce on the myocardium, and also whether the effect of these substances would cause the heart to be more readily injured by toxic agents, that used being chloroform. Rabbits receiving daily one gm. of thyroid gland or one mg. of crystalline thyroxin intravenously every other day showed a marked increase in pulse rate, more forceful action of the heart, loss in body weight, increasing irritability, and often diarrhea and falling out of hair. These animals were killed at periods of two to three weeks and showed relatively slight though definite lesions in the myocardium. Animals which were similarly treated, but, in addition, were subjected to chloroform anesthesia, showed more striking widespread myocardial necrosis. Goodpasture says that their experiments indicate clearly that chloroform as an anesthetic in cases of hyperthyroidism is likely to be exceptionally detrimental to the myocardium.

Use and Abuse of the Electrocardiograph.—Olga S. Hansen (*Minnesota Medicine*, November, 1921) writes that the electrocardiogram will tell us if premature beats originate in the ventricle or the auricle, and will show preponderance of one ventricle over the other. It will show auricular fibrillation with or without disturbance of impulse propagation in the ventricle, and either partial or total heart block. On the other hand, it will not show heart sounds, the size of the heart beat or of the pulse wave; it is also possible to have a serious muscle disease with a normal electrocardiogram if the path of conduction is spared. A negative finding is of infinitely less value than a positive one. Normal tracings do not necessarily mean a normal heart, for the electrocardiograph records only the events of impulse initiation and propagation in the muscle and the changes in the position of the heart. Like all other graphic methods it should be considered only as a part of a clinical examination.

Nature of Hypertension.—Henry A. Christian (*New York State Journal of Medicine*, August, 1921) states that theoretically blood pressure is increased by the following factors: a, a decrease in the size of the peripheral blood bed; b, an increase in the cardiac output; c, an increase in the total volume of blood; d, an increase in the viscosity of the blood. At the present time most observers consider the decrease in the size of the peripheral blood bed as the most important factor in the causation of hypertension, while relatively few regard the increase in the volume of the blood as the chief factor. To sum up the evidence it seems that we can consider that hypertension, though occurring with nephritis, has other causes than renal insufficiency and that the finding of hypertension by no means justifies a diagnosis of nephritis. The causes of hypertension are probably multiple, and the mechanism is not always the same, but varies. In the final analysis the most probable mechanism of hypertension is a narrowing of the peripheral blood bed. It seems to the writer that hypertension is not to be regarded as much a disease as an evidence of disturbance of the cardiovascular mechanism, a disturbance mainly in the smaller peripheral vessels, much as fever is regarded as an evidence of infection. Certainly if hypertension has more than one cause, it is not likely any single form of treatment will be successful in all cases.

Epinephrine Hypersensitiveness and Its Relation to Hyperthyroidism.—Francis W. Peabody, Cyrus C. Sturgis, Edna M. Tompkins, and Joseph T. Wearn (*American Journal of the Medical Sciences*, April, 1921) draw the following general conclusions: Different individuals, both sick and well, react with different degrees of intensity to the injection of epinephrine. By means of selected doses of the drug and carefully chosen criteria for the response, a somewhat artificial differentiation can be made between the slight reactions called negative and the more violent ones called positive. In certain instances doubtful or questionable reactions are obtained. The fundamental nature of the reaction is unknown. It is associated with a rise in heat production which runs more or less parallel to the intensity of the reaction. It seems probable that the phenomenon is due to a stimulation of the sympathetic nervous system. Theoretically a positive reaction might indicate hyperactivity of the thyroid gland, of the adrenal glands, or of the sympathetic nervous system. It might, on the other hand, depend on a lowered threshold of response of the sympathetic nervous system. With the exception of hyperthyroidism little is known about these conditions in man, but they probably occur and there would seem to be no reason for assuming that a positive epinephrine reaction is constantly associated with hyperthyroidism. It is much more likely that different causes account for the reaction in different types of clinical cases. Hypersensitiveness to epinephrine is found in many patients with the clinical picture of hyperthyroidism and with an increased basal metabolism, but it is not constant under these conditions. Hypersensitiveness to epinephrine is also found in persons who have no indications of hyperthyroidism. Thus it was present in many psychoneurotics in about fifty per cent. of patients convalescent from acute infections, in nearly the same proportion of soldiers with effort syndrome, in fourteen per cent. of apparently normal young men and in patients with various unrelated diseases. The positive reaction to epinephrine appears to occur most often in highly nervous individuals, but it is not constant in such persons. The clinical significance of the reaction is not clear, but at present it should certainly not be regarded as having any specific significance in the diagnosis of hyperthyroidism.

Synergistic Analgesia with Nitrous Oxide Oxygen and Magnesium Sulphate.—James T. Gwathmey and James Greenough (*Medical Record*, October 1, 1921) describe in full the technic which they have followed in between forty and fifty cases. Two soapsuds enemas, one hour apart, or one followed by a thorough irrigation until the water returns clear, are given the night before the operation. A tapwater enema is given early the next morning. The bed is screened, the rooms darkened, and quiet demanded. Two hours before the operation a chloretone suppository, fifteen grains, is given, after which the patient is not allowed to leave the bed. One half hour later a breast hypodermoclysis is given of three or four hundred c. c. of a sterile and chemically pure solution of magnesium sulphate at a temperature of 110° F. The whole procedure should be done aseptically, the solution running in by gravity in not less than thirty minutes. A towel is placed over the face and every inducement offered for sleep. The first hypodermic of morphine is given one and a half hours before the time set for the operation and consists of one eighth of a grain. This is repeated at fifteen or twenty minute intervals until the full amount is given, the average adult dose being three eighths of a grain. Then the anesthetic mask is applied and oxygen started at the same time as the nitrous oxide. At no time should the patient be cyanosed or any attempt made to induce the usual signs of anesthesia. The appearance of the patient is better than when the gases alone are used and shock has been invariably absent; wound pain is a thing of the past, the patients being comfortable for fifteen to thirty hours after the operation with no nausea, and with a normal pulse and respiration.

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Treatment of Empyema with Gentian Violet.—Ralph H. Major (*American Journal of the Medical Sciences,* September, 1921) reports that in a series of twenty-seven cases of postinfluenzal empyema, fourteen patients, or 51.8 per cent., were cured without operation by repeated aspiration and intrapleural instillations of gentian violet. No relapses occurred and no deformities of the chest developed. The presence of frank pus was no contraindication to treatment by this method. It is possible that some of these patients would have recovered without the use of gentian violet instillations, yet because of the prompt symptomatic response to such injections and the rapid diminution or disappearance of bacteria in the pleural fluid it was evident that the dyestuff possessed a definite bactericidal value.

Potassium Content of Normal and Some Pathological Bloods.—Victor C. Myers and James J. Short (*Journal of Biological Chemistry,* September, 1921) used the cobalt nitrite method of Drushel for the determination of potassium. They found that more satisfactory results were obtained on serum than on plasma. In most of the analyses the corpuscles were separated from the serum by a double centrifuging about two hours after the specimens were taken. When this was done, none of the pathological cases studied showed abnormal figures for the potassium of the serum. Seven nephritics with marked nitrogen retention showed no increase in the potassium content of the serum or whole blood, but rather a decrease in the potassium content of the whole blood. This result does not lend support to the suggestion of Smilie that some of the symptoms of uremia may be due to a potassium poisoning as a result of retention of this element. The potassium content of normal human blood serum is rather less than twenty mg. to one hundred c. c., and for the whole blood the figures are eight to twelve times that amount.

Treatment of Acute Suppurative Pleurisy.—Hitzrot and Weeden (*Annals of Surgery,* May, 1921) conclude as follows: 1. In the case of suppurative pleurisy due to the pneumococcus, proper drainage instituted early and maintained long enough produced a satisfactory cure. 2. In the cases of suppurative pleurisy due to the streptococcus there were more underlying lung conditions (abscess, etc.) which required more varied treatment, and secondary operations were more frequent. 3. The average stay in the hospital for the uncomplicated cases in this series was thirty-two days. This includes the cases due to the bacillus typhosus but not the deaths, the unsatisfactory results, or the cases submitted to secondary operations.

Management of Malingering.—Tom A. Williams (*Military Surgeon,* May, 1921) says that it must be remembered that there is a strong temptation for a patient who is really suffering to exaggerate his symptoms if he is the least suspicious that the doctor is going to regard them too lightly. This is particularly true in cases of sciatica, neuralgia, or lumbago. This tendency of the patient makes the examiner's task sometimes difficult, as he is in danger of falling into the mistake that the patient has nothing at all the matter because so many of the symptoms he presents can be shown to be simulated. The best way to prevent this tendency of patients is to obtain the reputation of honestly considering each case on its merits and to avoid the reputation of being too ready to minimize the man's complaints. Some neurologists adopt the plan of permitting other patients to witness each examination. In this way the men become impressed with the thoroughness of the doctor's examination, and with the fact that he does not ignore legitimate complaints. As soon as the men understand this, they are deprived of their chief motive for exaggeration of symptoms, unless it is a case of out and out malingering.

Mechanism of Lowered Resistance Following Exposure to Lowered Temperature.—Lewis B. Bibb (*American Journal of the Medical Sciences,* August, 1921) offers the following hypothesis in explanation of the increased susceptibility to bacterial invasion brought about by chilling the surface of the body: 1. That vasomotor tone and organ function are maintained by the successive functioning of different shifts or relays of cells, each having its own threshold of susceptibility to stimulation and rehearsing its stereotyped function according to the laws of fatigue and its own individual needs. 2. That vasomotor changes exert a provocative or stimulating effect on tissue cells, causing an increased discharge of function. 2. That early though fully developed inflammation with all the classic symptoms is to be explained as excessive liberation of cell function, and this may lead later to exhaustion, incoordination and the consequences of these. 4. That the cell tends to summate the various similar and dissimilar stimuli playing upon it at each given instant and react to its environment as a whole. 5. That the vasomotor changes set up by lowered temperature can be summated with the stimulation from relatively harmless bacteria, so as to bring on an excessive liberation of function constituting an inflammation of the affected part.

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Modern Commentaries on Galen

His Formulation of Humoral Doctrines

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Anyone who has been at pains to glance over the essays I have contributed to the NEW YORK MEDICAL JOURNAL during the last year or two will have noticed that in dealing with Hippocratic medicine I have had frequently to refer to Galen who lived five or six hundred years later than Hippocrates II. This has been more particularly the case when, in the commentaries on Hippocrates I have had to take up the humoral theory, which as we have seen was in existence long before Hippocrates and which we shall have occasion to realize persisted long after Galen who gave it permanent form. It rested on theories of the cosmos, some of whose origins we can easily surmise, but many of which are lost as we recede into the mists which shroud prehistoric man. It was, however, to Galen its formulation or crystallization was due and in this form, almost unaltered, it was transmitted to generations of men but lately passed away. The Hippocratic humoral theory, we can easily perceive, was still in the fluid or molten stage. To keep up the continuity of the discourse it is therefore necessary to pursue it into Galenic medicine and in order to see how it was to fare there we have had to stop to consider (15) the manner of man Galen was and to touch somewhat upon the manners of men among whom he lived, giving only a shadowy indication of the historical background of his times. Here in as broad outline as possible we must consider the processes of this crystallization in which Galen was the chief agent, a crystallization corresponding in time, if not actually dependent on it, with the general stagnation of intellectual life preceding the collapse of the ancient Greco-Roman civilization.

It is quite plain to me that Hippocrates did not originate it, and was a slave neither to that or any other theory. Galen, for all his excess of adulation of his great predecessor, was not accustomed to think of this as a theme to be exploited in the laudation of anyone. He says (13) he appears "an upright and honest man, a slave to neither ambition nor vanity." It does not occur to him to extend the phrase in the way we would—"or theory," but ends it in the present stock manner "and a lover of the truth." The alteration we would inject into the conventional phrase is significant of the change in the fundamentals of science from the example Galen set a long posterity. There were empires enough in his day, and he hated them; looked down on them as we, on the other hand, do on ideologues and theorists and metaphysicians, but Galen put the latter in the saddle for more than a thousand years. We are apt to think that if the ancient seeker after truth had only left on one side all theory, if he had only said as our idols say, and their sayings have got into the worst sort of advertising today, "I don't know, I will investigate," the course of medical history would have been different.

Now as a matter of fact this silly theory of the humors sprang into most vigorous life in a period when anatomical and physiological data were being exposed in Alexandria to the grasp of the human intellect in a profusion which had never before been exhibited in the annals of science and which has only once or twice been rivalled since. It almost seems as though these facts, paralyzed or sterilized the mind of man and reduced his reasoning powers to imbecility. It is not necessary to put this to the test further than to attempt to reduce the humoral theory to any degree of plausibility in our own minds. We can be sympathetic toward the pneuma; that had in it the germ of mighty things, but one has only to read the interminable disquisitions of Galen on the humoral theory to appreciate the degree abasement of mentality in man can reach. A man of restless energy, of acute observation, of the courage of his convictions, not a charlatan or a false man at all, writes as though he was too lazy to think, too dull to observe, and too craven to tell the truth. For pages he entertains and discusses the proposition that a thing may at the same time be both moist and dry, both cold and hot, that a moist thing may have in it the potentiality of rendering the body dry when used as a medicament, and that at a time when these terms, now so meaningless in science, meant something. After reading it all, as I have done,

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one, as much in deliberate opinion as in exasperation, comes to the conclusion that imbecility and asininity can no further go.

But ignoring the natural revolt of the modern mind at methods which it has now been trained to view with contempt, it would be blinding one's self to the tremendous services Galen has rendered the art of medicine to stop at the justification of this acerbity. Despite the tangled underbrush and its profusion he afforded a grateful shade in the desolation of the desert that stretched around his work for a thousand years. He collected with his unexampled industry, with his scarcely less valuable volubility, offering it freely to his fellowmen, the treasure within his reach, before the great Roman Empire, at its height in his day, tottered to its fall. Tiresome and quarrelsome, devoid of humor and full of conceit, acute in mind but dull in understanding, if I may venture on antithesis in pointing out a shade of discrimination in the two terms, he nevertheless has treasured up for us a knowledge of the medical art before his day we could have gained from no one else. If he is not literally the sole preserver of its more ancient traditions, he is by far the chief of them. Theophrastus and Celsus we have, and even Aristotle, not to mention a host of minor names, but they exhibit each only a few of the flashes of reflection we are on the alert to recognize in our study of the thoughts of a great and glorious past. This we must keep steadily in view in reading his works, when we are disposed to cast them aside with some of the spurious trash of the Hippocratic corpus as useless, because what he has to say is often so devoid of value in itself, so puerile in its inability to withstand rational analysis and a searching criticism.

The ancients did not know black was not a color, they did not know dryness was no moisture and cold no heat. We ourselves only appreciate that pleasure is no pain when a bad toothache suddenly stops, yet this the ancients knew well. For them too the void and no being were realities quite as much as heat and wetness. The state of being wet and the state of being hot and the state of being at all had their opposites, just as white was the opposite of black—all color and no color—we put it, who are modern materialists insisting all we really know we know from our senses, and when we do this we join the band of ancient materialists whom Socrates scourged for insisting man is the measure of all things. I wish it was as easy to point out the differentiation between all the fallacies and inconsistencies of the ancients and those of the moderns as it is in this particular instance. It is the lack of a thorough appreciation of such things which induced the modern philistine to declare that the science of the ancients, like the text in which it is written, is all Greek to him. At any rate this minimum of difference in the point of view must be kept in mind if we are to get into touch with the folly laden theory of the humors, for no theory is so foolish it has no support in truth. It is the inextricable way truth is entangled in folly that gives us the most trouble. We have straightened out many of the difficulties, which I have broached in what I have just written, with our thermometers and hygrometers and pressure gauges and latterly with all the infinite varieties of laboratory paraphernalia, the pomp of science.

We have gone a long way since the time when none of these things were. We have come to realize that even space and time are not realities, though the ancients had their adumbration of this too and that after all realities are but relative, just like speed. About the best the ancient could do with verbal difficulties, which much more largely to them than to us seemed the only ones, was to establish measures for adjectives which have, none of them, any place at all in modern science. I think it is in Plato, at least it is referred to in Galen (12) that we find soft defined, by him and by Aristotle as something human flesh, at the end of the finger for instance, yields to, and hard something to which the finger pulp yields. Even their weights and measures varied with the latitude. Across a narrow strip of water or from one contiguous province to another, not the coins of commerce alone but other standards varied so greatly that confusion was constant for the ancients; for us it is confusion thrice confounded as we read. The havoc wrought in military and political affairs by the trouble with the calendar drove Julius Cæsar to reform it and Pliny tries hard to explain it, but on the whole fails.

It was this age of the inexact into which Galen was born. Even the dialectical necessity for Socrates to have something definite to stand on when he started in to reason about the qualifications of matter, even the trouble the great imperator had in setting up a measure of time, even the glimmer some of the philosophers had that there might not be anything material about either space or time was of no avail in awakening Galen to the bogginess of the humoral theory. His quite commonplace mind was entirely incapable of enlarging the bounds of science by following out the leads his great predecessors (5) had opened for him and after Galen science slept for something like forty or fifty generations. During that time the four qualities, the dry, the moist, the hot, the cold, remained the mushy bed on which it slumbered. That is about all the humor can be gotten out of humoral doctrines for the casual modern reader. In that respect I think it would be difficult to find a personality with less appeal to the common run of laymen than Galen. In a historical way he above all men gives rise to the feeling that he handed on to an innumerable posterity a vast and impenetrable jungle of false philosophical doctrine and medical mistakes, furnishing himself only a feeble and uncertain light to illuminate it, but adding little or nothing else to medical science. However, it is sufficient for the glory of any one human being that he did hand it on through the dismal swamp which reached from his time to that of Vesalius and Galileo. Perhaps the very commonplace of his genius itself is the cause of this great triumph. I have pointed out elsewhere more specifically the character of the man himself which is revealed in the astounding mass of reading matter he has left to us.

Galen (1) declares Hippocrates was the first of all physicians and philosophers, whose names have come down to us, to declare there are four elements, four humors, and four qualities of matter, which all interact with one another. We may pause for a moment to remember that repeatedly we find adjective qualities spoken of by the ancients as substantive and material conceptions. We do not readily see the trouble when they treat of a warm object as due to the mixture of heat and matter, but when we find them consistently looking to the mixture of cold with it or of dryness we perceive the necessity of doing away with fundamental errors in dialectics before progress can be made. As a matter of fact, in the books which more recent criticism has left to the authorship of Hippocrates II, we find him specifically refusing to limit the qualities to the number four and we find him seemingly trying to circumnavigate other errors in the conception of the qualities of matter, at least not following out the theory to its extreme implications, as Galen and the spurious books of the Hippocratic corpus do. So far as the evidence available today goes, Hippocrates does not seem the first at all, even if he wrote the books Littré refuses to accept as genuine, to formulate the humoral doctrines. That, as I have attempted to point out in other essays, was done as early as Empedocles (14) at least. I do not know what idea Galen had of their relative chronology, but he is more familiar than we are with both Empedocles and Hippocrates. Yet it is difficult for us, with the materials at hand and the practice of historical criticism grown familiar to us, to avoid placing Empedocles much earlier. In Galen we often get, as we do in Aristotle, the indubitable echo of doctrines we have grown to associate with Empedocles, some of which they acknowledge were derived from him, some are without such acknowledgment, and some Galen attributes to Hippocrates or Aristotle which we find in the fragments of Empedocles, as now arranged.

What the earth is to the trees, Galen urges, the stomach is to animals; it nourishes, warms and refreshes. This is the fashion of speaking found in the fragments of Empedocles which modern research has assembled for us. As the vines draw their nourishment from the earth, so the veins draw it from the stomach (2), both of them by the virtue of the innate qualities they possess. Aristotle supplied a word, *entelechy,* for all these physiological and other embarrassing mysteries, which for ages was and still is the refuge of all baffled dialectitians, variously translated by various vitalists in modern times, but all smacking and smelling of the same tautological flavor. Criticism had not advanced far enough in the time of Empedocles for him to realize that he also had need of a subcellar into which to retreat when using such devices of dialectics, nor is Galen even reminded by Aristotle's verbal detour that such precautions are called for.

Driesch and Bergson in a more critical age realize the convenience of such a refuge, but are more aware than Aristotle of its insecurity. What indeed do "innate tendencies" mean, whether used by modern physiologists or in the broader domain of general biology, or as employed by Aristotle and Empedocles in a dead language 2,500 years ago? Galen seems never to have asked the question. Few authors are free from slipping into such verbal inanities and even Hippocrates in *Ancient Medicine,* where he makes use of some humoral doctrines (19) falls back on this remnant of primitive demonology alluding to "powers" or dynamic influences which in the very etymology of the words used betray the old demons of disease at work in the body of man. I am not holding this up in ridicule of anybody, I regard primitive pantheism as the most acceptable of all religions, but it does not belong in science and it is ruination to the human intellect not to perceive its trail in the history of thought. We find the thought of Empedocles saturated with it. Hippocrates gave, however, very much more emphasis to the effect of environment (3) and the comprehensible forces of Nature than he did to "innate tendencies" of the germ plasm, that mystic modern entelechy, that offshoot of primitive pantheism, which masquerades in modern materialism.

Owing to the fragmentary state of our knowledge of the medicine between Hippocrates and Galen we are almost altogether dependent on the latter for the bulk of what we know of it. We cannot help taking note that Galen is a dogmatic so imbued at once with the sanctity of the humoral theory and with reverence for Hippocrates that he unduly stresses the predilection of the master for it. We are so distrustful of the capacity of Galen for starting anything new we are quite ready to believe his assertion that this theory was entertained by all the best minds in the Alexandrian epoch, with the exception of Erasistratus, who disputed with the Coans (5), but that exception is an important one. Celsus speaks with great respect for Erasistratus and does not emphasize the preponderating influence of humoral doctrines in his time, possibly more than a hundred years earlier than Galen. The latter's disputes with his Roman colleagues were frequent and acrimonious and some of the animosity he excited may well have been due to his own doctrinaire intolerance. He was an Asiatic Greek and for various reasons it is warranted to conjecture that the humoral doctrines were more prevalent on the continent of Asia than on the coast of Africa or in Greece. Rome herself originated nothing. It seems probable then that it had taken its rise before the time of Hippocrates, grew in his life time, spread rapidly afterwards and the writings of Galen rivetted it in medicine until within hailing distance of our own time. We may be sure that none of the "true" doctrines manufactured since will ever have such a career.

In the *Nature of Man,* which Galen ascribes largely to the authorship of Hippocrates himself, Melissus is mentioned as a monist who believed the four elements sprang from a single one. Galen in commenting on it (7) seems encouraged by the thought to assert that each of the four qualities springs from one of the four elements, heat from fire, moisture from water, but he hesitates for some reason, not very clear, about cold from the air. He refuses to regard the qualities on the same substantial basis as the elements, but "to the nature of man belong blood, mucus and yellow and black bile." He ascribes to Hippocrates a turn of thought which we recognize as veering in the proper direction. The qualities are merely manifestations of the elements, but he takes no note of Hippocrates asking in *Ancient Medicine,* why four precisely? That is to be inferred from his incidental remarks in discussing the hot and cold, the dry and the moist, when he introduces the sour and the insipid, the bitter and the sweet, as interesting him quite as much. Now it is important to mark these little characteristics and contrast them with the tenor of the discourse of Galen. The latter is a slave bound hand and foot by the terms of the theory and Hippocrates is a free man, willing to entertain theories when they help him, but quite as ready to ignore them when he does not need them.

In a book (8) ascribed to Galen, with some doubt, we find the author explaining why qualities are incorporeal. The style differs from Galen and the logic is better, but it advances views consonant with the doctrines found in the less doubtful books. In these on the death of the body, Galen copies Melissus in thinking of the qualities, as well as the elements, merged into one another in the process of decomposition, involving of course the destruction and the merging into one mass blood, muscle, nerve, bile, etc. For him it is the loss of structure and form, it is the chaos of the elements again, but the qualities for him are quite as indestructible as the elements, so that we see him, to the modern view, shooting off upon a quite false trail, bent into it by the very doctrine of the substantiality of the qualities which he is at pains to dispute.

This all seems very absurd to us, but how is it any more absurd than the modern cosmical theories, of the ether for instance, with its qualities of infinite hardness and infinite elasticity? Is it any more absurd for the ancient man to think he can imagine a void than it is for the modern man to talk about a granular ether without accounting to himself for what exists between the granules? There is nothing but the "insanity" of an algebraic formula which attracts us to the absurdities of modern relativism. Why should the scientist, modern or ancient, think Tertullian's saying a joke? *Credo quia absurdum.* There is no excuse for us who dwell in such cloudy glass houses in science to throw stones at one another nor at any neighbor. Melissus seems to have followed Thales and other Nature philosophers in introducing his monistic theories into medicine and in various places in Galen's work this is referred to, but I will not further entrench on ground I have already traversed.

Though this ground has not been very thoroughly covered, specific citations of the working of the theory in practice have been still less exercised, but naturally no exhaustive treatment of this in detail is possible. Nevertheless I may with some advantage extend a little the excursions I have already taken in this journal. In his writings Galen is continually uneasy in the reflection that he must explain how his practice is consistent with theory. He spends pages getting out of one difficulty into another, occasionally calling on God Almighty to help him, in true vitalistic fashion. Bleeding and purging is a matter of the first importance in nearly all cases to get rid of peccant humors, and jaundice is only one of a multitude of indications that they are at fault. One very much less frequently finds anything suggestive in its application to pharmacy, but opium and mandrakes and soporifics generally owed their physiological action to their coldness. It is often far from clear why drugs had these qualities, associated with specific forms of matter in ancient philosophy. Usually it was apparently due to the results of their real or supposed physiological action. In the case of these soporifics and of some other poisons, in marked stages of it the surface of the body is cool. The qualities attributed to animals, on the other hand, were due apparently to the character of the animal's temper and his habits. Drugs, however, had them, and however they were acquired it was by virtue of their adding to the body of the patient or exciting in his body such qualities that the equilibrium of health was maintained or restored.

Sudorifics, diuretics, expectorants all find their place under the same theory. That he was often at a loss, from the failure of indications he could recognize, is occasionally quite evident. More than once he seeks supernatural help from dreams. He tells us (4) this has at times been his reason for bleeding patients. It was a dream urged his father to make him a doctor rather than a philosopher and on the whole we have no reason to criticize the choice of alternatives. Galen is led into the statement that the flesh of the lion is warmer and drier, that of the sheep colder and moister (9). This is not Hippocratic medicine, this is Galenic medicine. But it is not all absolute nonsense, even to modern readers. "The vigorous age of all animals is especially in the middle between extremes, not in old men with dryness at its height, nor in children bathed in their humors and in much moisture. Why do so many noted physicians insist on the humidity of old people? Are they misled by the abundance of the excretions? The eyes are suffused with tears, the mucus dripping from the nose, saliva from the mouth, their cough and expectoration indicating as it were the lungs are full of it; the bowels, too, are full of mucus, some of the joints also. Nevertheless, nothing of all this proves that the bodies of elderly people are any the less dry for it. The arteries, the nerves, the veins, the membranes and sheaths of all the muscles you will find much drier than they were formerly, but poured around them, inside and out, something of glairy humor and mucus (10)." "Just as lanterns, torches and other such oily things are apt in burning to form charred matter, so also in living bodies frequently the humors produce something similar to soot," and from the dark dry appearance of the tongue one may know the humors were being dried up (6).

Medicaments also have the power (innate) of drawing out of the humors certain properties of evil or even one humor out of the other as the bile from the blood. Some such idea attached to the working of antidotes. Galen says he knows all about this in the case of poisons but will not, for reasons of humanity, disclose what he knows. However, he discloses enough to allow the reader to guess why he is not willing to disclose more about poisons. In this interest one more quotation may be allowed me, as it illustrates also the power of the ancient mind as to the power of innate qualities of attraction. As the stomach and liver draw bile from the blood, as the tree draws nourishment from the ground, so the idea is extended in the tale Galen thinks worth while to tell. When, as a boy, he was among the Thracians of Bithynia there was a man who had found a plant that would draw the blood out of a pig's liver when laid on it, and the man claimed it would do so if laid on the skin of a man. The magistrate had him killed blindfolded so that he could not demonstrate his dangerous knowledge (11).

These youthful object-lessons were not lost on Galen and his reticence in regard to poisons is satisfactorily explained, but the story is also suggestive of the deep rooted superstitions of hither Asia out of which the humoral theory, like most of the religions of man, may have sprung. In general, so far as it applied to drugs, experience had ultimately to decide, and as Galen inadvertently but frequently lets it be seen he realizes this precept of even modern therapy, it is not probable that a great deal of harm arose from treatment, at least in his hands, though resting on such an absurd basis.

The author's references will appear in the reprint. The first thirteen are from *Galeni Opera Omnia* (Kühn edition).

Metabolism During Starvation and Undernutrition*

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In our consideration of the metabolism measurements made on children we noted that in general the larger the organism the larger the heat production, but that there is a specifically high heat production with young children, so that per kilogram of body weight the heat production is much larger with young children than it is with adults and falls off as the weights of the adults increase. You will, furthermore, recall that the curve representing the metabolism per kilogram of body weight for girls and women was throughout its entire length somewhat below that for men. It seems best to consider the metabolism as affected by two factors, which frequently enter into the picture presented by many patients. The influence upon basal metabolism of the complete withdrawal of food, on the one hand, and persistent undernutrition, on the other hand, must be especially considered. These problems have intense physiological interest, entirely aside from their pathological connections, for in studying the transformations of energy in the body the simplest condition is that when no food is taken. What will occur in the human body when the individual lives upon his own body substance for a considerable period of time? In other words, what is the course of the metabolism during complete, prolonged starvation?

OBSERVATIONS DURING SHORT FASTING.

This particular problem has been studied rather intensively by the Nutrition Laboratory, and indeed, before the establishment of the laboratory it was studied in the chemical laboratory of Wesleyan University, where a relatively large number of short fasting experiments, ranging from two to seven days each, were made upon different individuals. These short fasting experiments showed rather pronounced changes in metabolism due to fasting and perhaps are of more clinical interest than those measurements made during prolonged fasting, for it is relatively rare that a physician meets a patient who has been without food for more than three or four days at the outside.

To consider this problem, a number of undergraduates at Wesleyan University, Middletown, Conn., were asked to go without food for periods varying from two to four days, and a semiprofessional faster was employed to go without food for several periods of from four to seven days each. During these fasting periods each subject spent the entire time inside of a respiration chamber, much larger, to be sure, than either of those used with infants and children, but not so large as that used for groups of individuals. The chamber was supplied with a bed, table, chair, window, and telephone, and resembled a moderately comfortable prison cell. During the period of observation the entire energy output of the subject was measured and likewise the water of vaporization. All excreta passed (urine and feces) were carefully collected and analyzed. Similarly, the oxygen intake and the carbon dioxide output were measured, so that at last we had a perfectly complete picture of the entire metabolic transformation of these subjects.

The conclusions drawn were based upon fourteen experiments made upon ten different individuals, and the completeness of the chemical and physiological analyses made it possible to arrive at a number of thoroughly established deductions, only a few of which can be taken up here. Body weight underwent, of course, the usual rapid loss. On the first and second days the average loss in weight for all experiments was one kilogram a day. On the third and succeeding days the average losses were 787, 883, 559, 391, and 497 grams respectively. The body temperature remained practically constant, with a smaller amplitude of the curve than is commonly the case with men consuming food and under like conditions of restricted muscular activity. The nitrogen in the urine increased for the first three days, and then subsequently decreased, although even during the longer experiments the output was rarely below 10.5 grams a day. From the gaseous metabolism measurements it was possible to compute the amount of fat, glycogen, and protein catabolized, and one of the most extraordinary findings was a pronounced depletion of the glycogen storage in the body during the first two days. In one case as much as 180 grams of glycogen were catabolized on the first day. After the first day and on subsequent days the amount usually ranges from twenty to forty grams.

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*The Second Harrington Lecture, given at the University of Buffalo Medical Department, Buffalo, N. Y., June 3, 1921.

Unfortunately the experiments were not ideally designed for the specific purpose of noting the basal metabolism as influenced by short fasting, that is, the subjects were not in complete muscular repose. They were, of course, in the postabsorptive condition, that is, without food in the stomach, but they were free to move about more or less, although we attempted to have the physical activity exactly the same each day, the subject following a detailed program made up from his observed movements during the first day. If we consider the experimental period during the night, from one o'clock till seven o'clock in the morning, when the subject was in bed and presumably asleep, we get more comparable data. During this period we find that there is a distinct falling off in the heat production as time goes on, although the evidence is not clear that the heat production to the unit of mass falls off. These short fasting experiments show, then, that the subject loses weight as a result of the fasting, thereby becomes a smaller animal, and consequently gives off less heat.

It is hardly possible in the time at my disposal to enter into an extended discussion of the details of these experiments, but a few charts and curves will give you an idea of the general progress of the metabolism during these seven days. From Figs. 1 and 2 it can be seen that the greatest changes take place between the first and second day, there being an increase in the fat catabolized to correspond with the marked decrease in glycogen catabolized. During the last three days, the heat production falls off notably, as does the carbon dioxide and oxygen and pulse, with profound changes in the loss of preformed water in the body.

As a result of these short fasting experiments these men did not undergo any great suffering or deprivations, to the extent that one would commonly expect. Ordinarily after going without a single meal we state that we are "all in," "faint," etc. These men were not, it is true, particularly keen about doing much work, but they certainly did not suffer. Hunger pains, socalled, were practically absent in all cases. These observations have a most important bearing upon the possibilities of experimental work on the complete withdrawal of food, and gave us reason to believe that in prolonged food withdrawal no great, immediate, cataclysmic danger may be expected, that the subject would not be unduly distressed, and that we could proceed on this line of experimental evidence to study the influence of prolonged fasting without any great danger.

RECORDS OF A THIRTY-ONE DAY FAST.

The opportunity for studying a prolonged fast did not occur for a number of years. Finally, a man from the island of Malta wrote, asking the privilege of coming to the laboratory and being the subject of a prolonged fast, stating that he had previously fasted from twenty-five to thirty or even forty days. Arrangements were eventually made, the man came to Boston, and we successfully completed a thirty-one day experiment with him, during which time there was a complete withdrawal of food, the subject consuming only about nine hundred cubic centimetres of distilled water a day.

In this experiment the subject was not asked to live the entire twenty-four hours inside a respiration chamber. He spent the day in the laboratory, undergoing numerous physiological and psychological tests, but did sleep inside the respiration chamber for the greater part of each night. The basal metabolism was, therefore, determined inside the respiration chamber during deep sleep, i. e., during complete muscular repose, and was likewise determined on another type of apparatus in the morning, after he came out of the respiration chamber. Numerous tests were made throughout the day to show his metabolism when sitting up, reading, or writing, together with innumerable observations on pulse, blood pressure, alveolar air composition, and exhaustive urinary analyses. These measurements resulted in a complete picture of the processes taking place during a prolonged fast.

It is obvious that the complete withdrawal of food from a human for a month must result in certain marked gross effects, which can be recognized without any particular apparatus or special tests. These gross effects may be grouped under the heads of body weight, the physical state, and mental and nervous condition. The most pronounced and striking results of the month's abstinence from food was, of course, the loss in body weight. This man went completely without food for thirty-one days. He lived. He lived on body substance. What materials of the body substance did he use and in what proportions? The mere statement of the loss in body weight will not answer any of these questions, but simply gives us the gross end results of prolonged drafts upon body material. But the nature of the material oxidized in the body, as well as of the more subtle physical and mental changes, can be explained as a result of the complete chemical, physical, physiological and psychological examinations to which he was subjected. Changes in body weight are by no means the most important findings in an experiment of this kind. The most important findings have to do with those inner processes such as the oxidation of material (specifically glycogen, fat, and protein) in the body, the heat production, body temperature, blood pressure, and pulse and respiration rate, and the physiology of respiratory processes in general.

Before we consider specifically the influence of fasting upon any one of these factors, it is of interest to note the different kinds of observations made upon this man. The more important are listed herewith: heat production, carbon dioxide production, oxygen consumption, rectal temperature, pulse rate, blood pressure, alveolar air, acetone in breath, respiration rate, volume of respiration, blood examination, anthropometric measurements, photographs, x ray examination, psychological tests, complete clinical examination, nitrogen in perspiration, and analyses of the fasting urine for total nitrogen content, content of urea, ammonia, uric acid, creatine, creatinine, chlorine, phosphorus, total sulphur, B-oxybutyric acid, and carbon, total acidity of urine, heat of combustion, and total solids.

Obviously to carry out a series of observations as complicated as this, a large staff and a tremendous concentration of effort were necessary, so it can easily be seen that the entire time of the nutrition laboratory staff, as well as the major portion of the time of several experts from the Harvard University Medical School, was devoted to studying this one man.

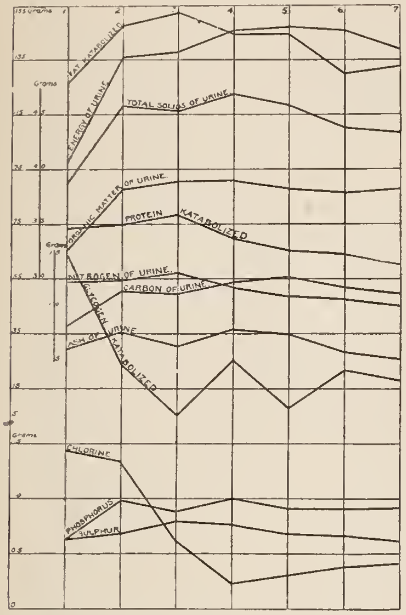

FIG. 1.—Catabolism during a seven day fast.

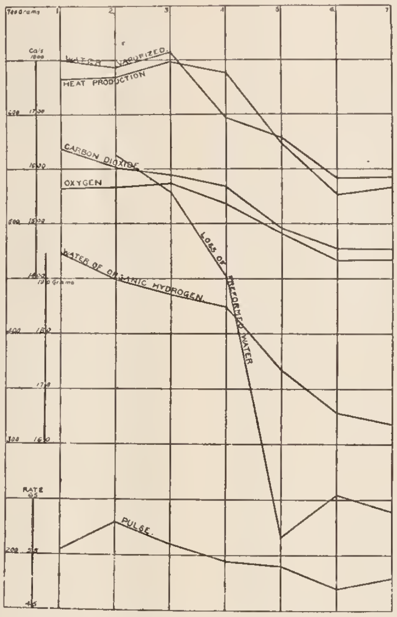

FIG. 2.—Catabolism, heat production, and pulse rate during a seven day fast.

Considering, first, the body weight, as being perhaps of most general popular interest, we find, as is to be expected, that it fell off markedly. It was considered rather undesirable to have the subject follow closely any of the scientific measurements or results, but he was keenly interested in his loss in body weight. The result was that each day a rough chart was placed upon the blackboard, showing the curve of his loss in body weight. A rather sharp fall during the first week took place, with a tendency to a less rapid fall later. While the body weight curve shows pronouncedly the loss in weight and loss in flesh, nothing is so striking as an examination of the nude photographs taken of this man prior to and at the end of the thirty-one days of fasting. He was moderately plump at the start and at the end was greatly emaciated.

The actual loss in weight for thirty-one days was 13.25 kilograms (twenty-nine pounds) or, roughly speaking, a pound a day. This corresponded to twenty-two per cent. of his initial body weight. In other words, he had lost over one fifth of his body weight at the end of the month. The most rapid loss was during the first week, for on the very first day of fasting we find a loss of two pounds. But the loss soon settles down to a pretty reasonable rate of about three hundred or four hundred grams (somewhat less than a pound a day). The nature of this loss is worth considering further. Obviously a large part of it is due to water. But from the respiratory analyses and urine examinations it is possible for us to compute the nature of the loss with great accuracy, and we find that from one hundred and seventy-five to two hundred grams of the loss in weight a day is represented by dry matter of the protein and fat of the body. In other words, about one half of the loss in weight was due to dry body substances and the rest due to water. The water reservoir in the body is, as we all know, very large indeed, since approximately sixty to seventy per cent. of the body weight is assumed to be due to water. I think few of us realize the great influence this large reservoir of water may play in changes in body weight. Many patients, intelligent patients, and, indeed, even clinicians, are likely to place altogether undue significance upon sudden losses or gains in weight. It seems to give a great deal of consolation to a fat woman to know that on the first day of a rigid dietetic régime she has lost two or three pounds. Perhaps this is of psychological help to her, and perhaps it is a great mistake to tell her that this loss represents in large part water. Similarly, sudden gains in weight are almost invariably due in large part to water.

As to the physical fitness of this man at the end of the fast, unfortunately relatively little can be said. He was quite disinclined to any kind of muscular work. We had hoped to make some simple muscular tests, such as, for example, the muscular efficiency of riding a stationary bicycle during the period of fasting, but this he refused to do. We did get observations on the hand dynamometer, which showed but little falling off in efficiency; in other words, he practically did not alter his physical capacity for special exertion, such as measured by the hand dynamometer. Still, he was extraordinarily active on the last day of the fast, probably due to a final spurt, was quite exalted, danced, sang, gesticulated freely, and walked with a firm tread.

As to his mental state, an extensive series of psychological tests was made by Professor H. S. Langfeld, of Harvard College, showing practically no untoward results following the fast. The man had a good mind. The very fact that he could, even at the end of a long fast, recall ten digits called off in random order at the rate of one a second, showed that he had an extraordinarily good memory. One may be interested in attempting to recall a series of numbers such as were given this subject by Dr. Langfeld, and thus realize somewhat better perhaps the capacity of this man's memory. A typical series, for example, was as follows: 8, 1, 6, 3, 2, 9, 0, 6, 3, 5. Throughout the entire fast the subject was obsessed with the idea of the benefit of the experiment to humanity. On the very last day I arranged for the faculties of the Harvard Medical School, the Tufts Medical School, and the Boston University Medical School, to see him in the laboratory. He stood up and spoke vigorously and energetically to a group of forty or fifty of these physicians, with a good strong voice, earnest and powerful gestures, discussing all questions of finance, state, and religion. Even on the last day of his fast his handwriting was excellent and his composition good.

However interesting these grosser effects, or rather absence of effects, on physical and mental processes, the most important results are those pertaining to the inner vital processes. For example, one of the first questions asked would be: "How did the results obtained with this man on the first seven days of his fast compare with those secured in the earlier fasts of short duration?" There was an almost perfect duplication of the characteristic features, such as loss in weight; glycogen catabolism at first rapid and suddenly decreasing; fat catabolism increasing during the first three days to compensate for the decreasing glycogen catabolism; increase in nitrogen in the urine for the first three days, followed by a steady decrease; increase in ammonia and in B-oxybutyric acid. The total heat production fell off as the body weight decreased. The heat per kilogram of body weight, as a matter of fact, fell off more than it did on the average of the earlier fasts, and the heat per square metre of body surface also decreased. Consequently at the end of seven days we had practically only a repetition of the earlier work, but of course the important phase of this fast was, how did the subject survive the long fast and what was the trend of the metabolism after the first week? Since this subject has been treated in monograph form, it is impossible of course to discuss it adequately here. This man underwent a very severe draft upon body material, there were great losses of nitrogen, fat, and glycogen, and mineral constituents, such as calcium, magnesium, chlorine, sodium, and potassium. There was a pronounced falling off in the respiratory processes and a lowered vital activity. In other words, he was living on a distinctly lower metabolic level. It should be stated at this very point that this important fact, namely, that the man was subsisting on a distinctly lower nutritive plane, has been capitalized successfully in the Allen treatment for diabetes.

As to how much longer this man could have fasted, only surmises can be made. He was particularly anxious to continue for forty days, but the Nutrition Laboratory staff was nearly exhausted physically, so it was decided to break the fast after thirty-one days. Now the great difficulty came at this point. There is a great secrecy among professional fasters as to what each believes is the best method of breaking the fast, and our subject was continually harping on this subject before the end of the fasting period. Contrary to all advice, he insisted upon breaking his fast by filling his stomach with the following combination. He ate four large California lemons, without water, six oranges, quarter of a pound of honey, and between 10 a. m. and 5 p. m. drank one quart of undiluted grape juice. At 5.30 p. m. he had probably one of the most pronounced and severe colics ever suffered by mankind. He remained at the laboratory under partial observation for three days, and then was removed to the Massachusetts General Hospital, where he remained for three days. He was seen a year later by Professor Langfeld and Dr. H. W. Goodall, who pronounced him in excellent condition.

Now the important conclusion from this study is too frequently lost sight of. In my judgment the important conclusion is not as to the amount of protein lost or the amount of B-oxybutyric acid developed, or the changes in the respiratory exchange, but is the very fact that the safety factor of the human body is so great that a man can withstand complete abstinence from food for thirty-one days without distress or permanent injury. The distress, you will remember, was brought about not as a result of the fasting but as a result of the unique method of breaking the fast. The tremendous importance of the conception that a man can fast this length of time without distress or permanent injury has only recently been emphasized. There has been an inherent belief in the minds of mankind for a long time in the great dangers to man and to animals of withholding food and that regular, indeed frequent, meals are absolutely essential to human and animal welfare. Only recently has the great rôle that may be played by the scarcity of food supplies been brought to our attention. Psychologically it may be of very great value, for example, to peoples who might be submitted to short fasts, through accident or otherwise, to know there is nothing serious or permanently damaging in such fasts. A few days without food on shipboard or in a mining accident, so long as water is available, cannot be of any great serious moment, for with resumed food supply there is an enormously rapid regeneration of wasted tissue.

An extensive series of observations is at present under way, capitalizing to a certain extent this important observation on men, namely, that the withdrawal of food for a considerable period of time is neither distressing nor permanently injurious. During the war every effort was made to conserve food, chiefly, it is to be said, to conserve food for men with, I think, too little attention paid to conserving food for cattle. But it is clear that now we may, without violating any physiological laws, take the ground that cattle may be kept without food for a few days without distress or without injury. It will take many years to change the popular views of people on this point, but we have only to consider for a moment the natural dietetic habits of many of the wild animals to note that they are continually undergoing periods of surfeit feeding, when food is plentiful, and periods of actual starvation, when it is necessary to migrate to other pastures.

Let me repeat, then, that my own feeling is that by far the most important conclusion to be drawn from these experiments on men during short and long fasting is that the withdrawal of food for periods of four to seven days with a large number of individuals and for a period of at least thirty-one days with one individual was brought about without distress, notwithstanding that the human being is most sensitive to his food supply and personal comfort. There was complete absence of socalled hunger pain. Secondly, the withdrawal of food for periods of seven to thirty-one days did not result in any sense in permanent injury. This is a most fundamental and revolutionary conception.

How soon information of this kind would be put to immediate, practical use, little did we dream at the time these measurements were made. With the onset of the world war, attention immediately began to be centred upon the question of food conservation, although little attention was placed upon the question of food restriction. Luxuries were to be avoided. Certain staples were to be reserved and sent to the foreign countries, and particularly when we ourselves entered the war, the importance of a readjustment of the entire American food supply became imperative. Still, all this time little, if any, attention had been paid to the possibilities of actually lowering the food intake.

The curtailing of food intake by complete withdrawal of food is of course impossible, save for a relatively few days or weeks at the most. The question did arise as to whether it was possible to readjust the food intake in the body so as to permit an appreciable, permanent curtailment in food intake. Since the caloric content of a diet must equal the caloric output, it is obvious that no curtailment could be thought of without first considering carefully the possibilities of curtailment of heat output. An analysis of the heat production of humans shows that with adults there are two distinct steps or phases. One is the irreducible minimum or the overhead charge, such as was emphasized in my first lecture in considering the caloric requirement of children. This is the inexorable demand going on minute by minute, hour by hour, which must be met either by food or, in the case of fasting individuals, by drafts upon body material. Secondly, in adult man a large factor is the energy required for muscular activity. While it is commonly considered that the quiet adult man gives off not far from two thousand calories a day, the Canadian lumberman, tramping through deep snow, cutting large trees in severe, piercing winter weather, gives off an enormous amount of heat, probably five or six or possibly seven thousand calories a day. This difference between a quiet demand of two thousand calories and the higher demand for muscular work represents a certain quota that might possibly be saved. If the Canadian wood chopper went to bed, we could save five thousand calories a day. We would not get any lumber. If all of our artisans could cease physical labor, tremendous savings in food could be made. During a period of war, however, when all are called upon for intense physical activity, this is the last method by which a savings could be economically made. Still, the general question as to whether it is possible to curtail food intake and maintain mental and physical efficiency was of such great significance that a series of experiments was actually entered upon to consider this point.

To study properly the influence of curtailment of diet, one must recognize the frailties of human nature in the desire to eat on the side, to disregard the actual caloric value of many substances not at all commonly considered as food, and realize that the strictest control is absolutely essential. This means that with humans there must be such a high degree of personal integrity and veracity that the problem of watching or espionage can be practically eliminated, for in studies of this kind scientists have a great many other things to do. We found in the student body of the International Y. M. C. A. College at Springfield, Mass., intense interest in all problems of physiology and nutrition, and when, through the kindness of Professor Elmer Berry, we presented the whole problem to the student body, we had a large number of volunteers, from whom we selected twelve, averaging twenty-three years of age. For four months these men, under strictest control, were kept on a diet with an energy content a little more than one half of their caloric requirements prior to the tests. As a result, the body weight fell, and when it reached a loss on the average of about twelve per cent., the caloric intake of the food was increased just enough to hold the body weight at this level. Hence a measurement of the caloric consumption at this sustained weight level gives a true index of the caloric requirement for maintenance. Twelve other men from the same student body, living under exactly the same conditions, aside from curtailment of diet, were selected for a control. They were subjected to much the same series of tests and observations as the restricted squad, and the two squads were studied side by side throughout the entire period of observation.

While a reduction in weight amounting to approximately ten per cent. could have been accomplished by having the men fast completely for fourteen days, we realized that these young men were, first of all, college students with obligations to their education and to their future, and only secondly volunteers for scientific research. A complete fast of fourteen days would probably have entirely disorganized their methods of life to such an extent as to interfere seriously with their college duties. Hence we decided simply to cut the diet so that the weight loss would take place in about six weeks. No change whatsoever was made in the quality of the food given, but the men were simply given half portions.

To avoid the possibility of a willful curtailment of mental and physical activity, corresponding in a small way to the going to bed of the Canadian lumbermen, the men were all cautioned to keep at their work just as long as they could, both intellectually and physically. As a matter of fact, these men carried out all the college requirements, both physical and intellectual, throughout the entire period.

While the body weight can be taken as an approximate index of the metabolic level, that is, the smaller the body weight the less the caloric requirement, we felt it necessary to measure the vital activities by determining the heat production indirectly from time to time. Practically every morning the members of the reduced diet squad had their basal metabolism measured on a portable respiration apparatus, and it is of interest here to record that this apparatus, which has been so recently taken up by the medical profession, was for the first time used in connection with these particular studies. The pulse rate was very frequently recorded. Practically every other Saturday night the entire squad was taken to Boston and placed inside the large respiration chamber, which, as you have already seen, was used for the girl scout experiments. Thus, the carbon dioxide excretion was determined during deep sleep, this measurement offering another important criterion for the estimation of the metabolic level.

The control squad showed no seasonal variation.

That is, as time went on, the basal metabolism was found to be absolutely identical with that of the first group of twelve men prior to the restriction in diet. To check the important findings with the first squad, the second squad was later placed upon a very restricted diet, that is, less than one half of the normal requirements, for a period of three weeks. Thus, ultimately both squads were on a reduced diet basis.

Every particle of food eaten and liquid drunk was carefully sampled and analyzed. The urine was collected throughout the entire time and the feces at frequent intervals, to study the digestibility of the foods. It was perfectly astonishing to find the spirit of cooperation shown by these students, who, in addition to all their intense college activities, had the patriotic spirit and the capacity to cooperate in these time consuming experiments, bothering to collect the urine and feces with the greatest regularity, and thus making available a complete picture of the processes resulting from undernutrition. At each biweekly visit of the separate squads to the laboratory in Boston the men were put through a series of seventeen psychological-physiological tests by my colleague, Professor Walter R. Miles, and records of relevant observations on introspection made.

The effects of the prolonged reduction in diet on the various bodily functions were most striking. Those dealing primarily with basal metabolism may be summed up as follows:

1. A gradual reduction in weight to a point twelve per cent. below the initial weight took place during a period of from three to ten weeks, with low calories and a moderate amount of protein in the food intake. The normal demand of the men prior to the dietetic alteration ranged from 3,200 to 3,600 net calories. One squad of twelve men subsisted for three weeks on 1,400 net calories without special disturbance.

2. After the loss in weight of twelve per cent. had been reached, the net calories required to maintain this weight averaged about 1,950, or but a little more than one half of the original amount required.

3. At the end of the reduction in weight, the actual heat output during the hours of sleep, as computed by indirect calorimetry, was approximately one fourth less than normal, thus giving a rough confirmation of the lowered number of calories found by actual measurement of the food intake. That there was no seasonal variation in metabolism was shown by the constancy in the metabolic level of the control squad.

4. The heat output by indirect calorimetry per kilogram of body weight and per square metre of body surface was essentially eighteen per cent. lower than at the beginning of the study.

5. The analyses of food, feces, and urine were sufficiently complete to permit a nitrogen balance to be made and it was found that throughout the period of loss in weight and for some time subsequent thereto, there was a marked loss of nitrogen to the body. In round numbers these men each lost approximately 150 grams of nitrogen. There is an intimate relationship between this surplus nitrogen and the metabolic level. Removing what we may designate as surplus nitrogen, we believe distinctly lowers the stimulus to cellular activity.

6. The nitrogen output per diem at the maintenance diet of 1,950 net calories was about 10.5 grams. The control group of twelve men, living substantially the same life and eating in the same dining room, but with unrestricted diet, showed a nitrogen output of fourteen grams a day.

7. The pulse rate was astonishingly lowered. Many of the men showed morning pulse rates as low as 33 and daily counts of 32, 31, and 30 were obtained; at least one subject gave six definite counts on one morning of 29.

8. The blood pressure, both systolic and diastolic, was distinctly lowered.

9. The skin temperature, as measured on the surface of the hands and forehead, was, with some subjects, considerably lower than normal. With most of the men normal temperatures prevailed.

10. The rectal temperature was practically normal.

In all details the picture exhibited by the first squad was strikingly exhibited by the second squad when their diet was reduced, although, since their loss in weight was not so great (six per cent. as compared with twelve per cent.), the phenomena were quantitatively somewhat less emphasized.

The psychological tests given by Professor Miles showed that in general it must be concluded that a prolonged reduction in diet produces some decline in neuromuscular activities, but this does not seem nearly so definite nor so large as the changes in metabolism and allied measurements. The psychological changes were not such as to interfere materially with the discharge of duties common to student life.

At the end of the test the men presented an appearance not unlike the average college student. It would have been very difficult to pick them out from the rest of the college body on the campus. They appeared slightly emaciated, particularly in the face, but they were performing their duties as college students with no obvious reduction in stamina.

A most interesting, though distinctly questionable test of the stamina of these men was made by a comparison experiment in the gymnasium of the college, in which twelve men from the student body were pitted against the twelve on the squad, in holding out the arms, motionless, until fatigue compelled them to be dropped. The arms were held extended, palms down, at the level of the shoulders. The number of men falling out was practically the same in both squads. As a matter of fact, seven in the diet squad and eight in the competing squad were still holding their arms out sixty minutes after the trial started, and it was necessary to stop at the end of the hour, owing to other engagements. Whatever one may think of this as a real test of endurance, it is significant that the men who had been on reduced diet for four months were not appreciably inferior.

A test of this kind, however, has relatively little importance as regards the capacity of the men for physical work, and my colleague, Professor H. Monmouth Smith, measured the energy required by these men during the ordinary process of walking a mile on a horizontal plane. For this purpose the men were given a certain amount of practice on a tread mill, run by an electric motor. Walking is a form of exercise indulged in by all. A slight practice in walking on a level treadmill was deemed necessary and was given the men throughout the winter. While walking upon the treadmill in the final tests, a measurement was made of the oxygen consumed and the carbon dioxide produced, and from these the heat production was computed. The measurements were made in an enclosed chamber. Air was circulated inside the chamber, but no fresh air added. The carbon dioxide was allowed to accumulate and naturally the percentage of oxygen was gradually somewhat reduced. In twenty minutes of walking, at the rate that these men walked, the carbon dioxide percentage had increased to about 0.8 or 0.9 per cent. As a matter of fact, this series of tests showed that the men who had lost weight actually had a slightly greater efficiency for this practised form of work, namely, walking, than the ordinary individual. The lessened load of the body and the lightened weight of the leg members resulted in a slightly higher efficiency for the propulsion of the body along the horizontal path.

The most noticeable discomfort experienced by the subjects as a whole was a feeling of cold, which, it is only fair to state, might be due in large part to the intense severity of the winter. In general, notwithstanding the very great reduction in metabolism (which we believe was due to the removal from the body of the stimulus to cellular activity of approximately 150 grams of surplus nitrogen), the whole period of reduced intake had no untoward effect upon the physical or mental activities of these men, and they were able to continue their college duties.

A word as to the recovery after this prolonged period of undernutrition is of importance. Having in mind the sad experience of our professional faster in breaking his fast with excessive amounts of food, unwisely selected, we cautioned the men repeatedly, telling them of the experience of the professional faster and suggesting that they begin increasing their diet but slowly. Unfortunately, the temerity of youth and particularly an especially fine spread provided by one of the members of the squad resulted in these cautions all being thrown to the wind, and we had not one but twelve cases of colic, which all cleared up in a few days.

The body weight recoveries were perfectly marvellous. A typical body weight chart for one of the members of this group is given in Fig. 3. The initial weight of this man was a little over sixty-four kilograms. This fell off finally to a level of not far from fifty-nine kilograms, at one time reaching the lowest point of a little under fifty-eight kilograms. On the resumption of full food, it can be seen that the body weight rose with tremendous strides. The actual initial body weight of sixty-four kilograms was passed in ten days. The weight then continued to increase until at the end of the observation this subject weighed seven kilograms more than he did at the beginning. Since we have here to do with the oldest man on the squad, aged forty-four, we can see this represents an enormous addition to weight.

With the subjects of the shorter fasts studied at Wesleyan University, it was noted that there was a distinct tendency for the men, after fasting, to take on weight and much more than regain the amount lost. With these two groups of men from the Springfield Y. M. C. A. College this tendency was even more pronounced and led to speculation as to the possibility of utilizing this enormously stimulated desire for resumption of weight in the economic feeding and fattening of live stock for market.

As to the conclusions legitimately to be drawn from this series of observations with regard to human nutrition, much that was demonstrated in the laboratory in this series of tests has subsequently been demonstrated *in extenso* in the enormous national experiments on underfeeding, carried out in Germany and Austria. Prolonged curtailment of diet is not necessarily disastrous. It has, it is true, especially when accompanied by the suffering, decline in business, and psychological depression prevailing in these countries, an untoward effect. Productive muscular activity is reported to be greatly decreased, much more so than with our men, but on the contrary our men did not undergo so protracted a period of undernutrition as have those in Germany and Austria. The permanent effect of very prolonged undernutrition on adults is yet to be demonstrated. This will be forthcoming in the history from German clinics in the next twenty years. Little, if any, argument, however, is needed to point out that marked undernutrition is distinctly disadvantageous to children and youths. Consequently, in periods of privation with insufficient food supply, adults should make every sacrifice to conserve food material for the benefit of youth. It is too early as yet to analyze the deleterious effects of undernutrition upon the immature in Germany and Austria, but it is clear that they are very pronounced. There is not so great a stunting of the growth as would be expected, but we must recall that Waters in Kansas has shown that immature beef animals, kept at constant weight, do not cease growing. Their skeletal growth takes place at the expense of muscle and fat, and the capacity to grow is never completely stopped. Resumption of full feeding results in the completion of growth. Similarly, the most remarkable experiments of recent years on the effect of the deficiency of vitamines and mineral constituents with white rats have shown

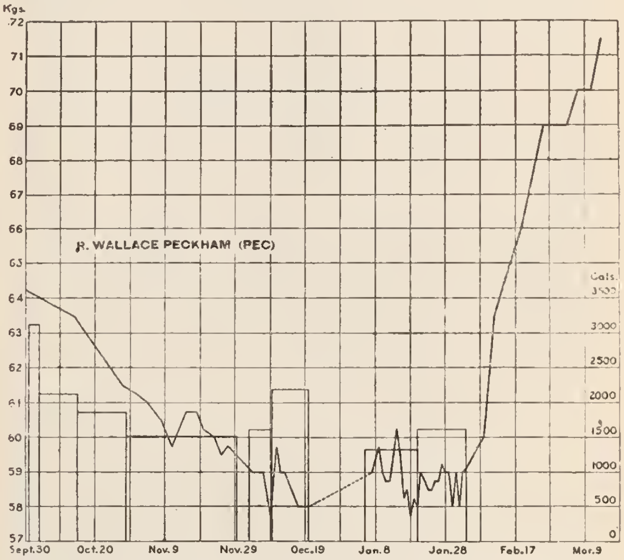

FIG. 3.—Body weight curve prior to and during undernutrition, followed by realimentation. Calories in food given by blocks, until unlimited diet began on February 3d.

that stunted animals will subsequently resume full size, when proper diet alternations are made. Our experiments obviously throw no light upon the influence of undernutrition upon growth. They do show, however, that with adults very considerable drafts upon body material, either as the result of complete withdrawal of food or of prolonged curtailment of the food supply, may be made without great discomfort, without permanent detriment, and the individuals can still carry out the normal, moderately active life, both intellectual and physical, of a college student.

The Diagnosis and Differential Diagnosis of Early Hip Joint Disease in Childhood*

By J. TORRANCE RUGH, M.D.,
Philadelphia.

Of all inflammatory conditions, there is probably none so frequently mistaken by the general practitioner as that of hip joint disease. There are two reasons for error in these cases. The first is failure to make a careful examination of the patient, and the second is ignorance of the fundamental symptoms which are present in the majority of cases.

Certain broad and comprehensive statements should be made regarding tuberculous conditions, the first of which is that prior to two years of age tuberculous disease of bones and joints is the exception. Those bone and joint conditions which are encountered during this period of life are almost always of a nutritional character or may be due to an acute infection. Furthermore, during this period of life, it is rather uncommon to find an infection (with the exception of an acute sepsis in the epiphysis of a joint) limited in all of the course of the disease to one part.

In the first place, the most common age for tuberculosis of the bones and joints is between two and about fifteen years. According to the ideas of many writers and clinicians, this age should be less susceptible to this type of infection, because the most common site of the infection is in the ends of long bones, where, during this period of life, circulation and growth are most active and one would expect that the hyperemia, which goes with increased growth, would prove more resistant to the development of a tuberculous process. Such, however, is not the case and the most plausible reason is that the great vascularity of these parts renders them more easily injured than others, and therefore the *locus minoris resistentiæ* is more readily established here than elsewhere. Another factor is that in childhood hereditary taints are more likely to become manifest than later on, especially so far as concerns the tuberculous tendency. It has also been maintained that, because of the quantity of milk taken during childhood, the danger of tuberculous infection from that source is greatly increased, and this has undoubtedly been a factor in the past, but with the more careful supervision of the milk supply, it has been greatly lessened. Again, the much greater variation in disturbances of nutrition in children lowers the resistance to the infection and renders them more susceptible. The failure, then, to bear these facts in mind contributes more to error in diagnosis than other things in general, but probably the most frequent cause of error is failure to examine the patient properly.

The diagnosis of hip joint disease depends, first, upon the recent history of the case and second, upon the symptoms and signs elicited by careful examination. Surgical tuberculosis is primarily confined to one part, and if multiple foci develop, they occur after a varying length of time has elapsed from the appearance of the first focus. The condition occurs most frequently in childhood, the age of election being between two and fifteen years. The onset is insidious, and the progress is chronic. There is usually a history of a slight injury having occurred within a month, which occasioned no concern at the time and from which the patient recovered in a few days. There is often also a history of an attack of measles or influenza within a few months before the onset of the disease. Either of these two conditions lowers the resistance of the patient to the action of the tubercle bacilli more than any other type of infection.

SYMPTOMS.

Intermittent limp.—The first symptom to manifest itself is an intermittent limp. It may be noticed in the morning and again in the evening or after active exercise, but there is no pain or other evidence of trouble present. The limp is peculiar in that there is a certain stiffness and the step of the affected leg is shorter than that of the sound one.

Muscle spasm.—The limp is due to the second symptom, namely, muscle spasm. The presence of the focus of disease is felt by the sensitive nerve system and nature attempts to immobilize the part by the contraction of the surrounding muscles. This muscle spasm or muscle fixation is beneficial so far as the ill effects of motion are concerned, but by reason of the pressure which it creates between the two portions of the joint, it tends to aggravate the inflammation in the parts.

Limitation of motion.—It close relation to the muscle spasm, there will be found a limitation of motion in the joint. The peculiarity of this limited function is that it concerns all directions instead of one or two, as in periarthritic conditions. The degree to which motion is limited depends upon the nearness of the disease focus to the joint surfaces and one can usually localize the disease, so far as the joint is concerned, by the amount of function that is present on careful examination. As the outer limits of the inflammatory area approximate the joint surfaces, motion becomes more and more restricted and when the joint surfaces become involved, all function ceases.

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*Read before the Philadelphia Pediatric Society, November 8, 1921.

Position of leg.—Great importance is attached to the position of the leg by many writers and clinicians, but there is no position which is constantly characteristic of the presence of this disease. The old classification of the three stages of the disease is, therefore, of no special significance, as there is no difference in the pathological process in the various periods of the process, and the position of the leg varies with that assumed by the patient in either standing or lying. It is also influenced by the location of the primary focus of the disease.

Muscle atrophy.—A symptom which is inseparable from the early onset of the condition is muscle atrophy. Observation shows that the trophic changes in the muscles are more profound in this type of infection than in any other inflammatory process, and furthermore, the atrophy is permanent to a greater or less degree, the muscles of the part showing a persistance of the change through the remainder of the patient's life. The atrophy has been shown to occur within the first week of the onset of the disease, and is explained as due to 1, disuse of the part, 2, to overuse of the muscles through spasm, and 3, to the direct effect of the toxins upon the trophic nerve cells. Careful measurement of the leg will also show an apparent lengthening or shortening in the early stages. This change is due to the position of the leg at the hip. If the leg is in the position of abduction, there will be apparent lengthening. If, however, it is in adduction, there will be apparent shortening, by reason of the alteration in the angle between the femur and the pelvis, but true lengthening or shortening does not take place until after destruction of the tissues in the joint.

Pain.—This is a late manifestation of the presence of hip joint disease, and is most commonly felt on the inner side of the thigh and knee, along the distribution of the obturator nerve. Pain in the hip joint is uncommon, occurring only if the process becomes acute, or is of synovial origin.

Night cries.—These occur after the other symptoms are fairly well marked, and are due to some movement of the joint during the sleep of the child, when the muscles are relaxed. The sudden contraction of the muscles as the child wakes causes a sudden sharp pain and the child wakes with a cry.

Elevation of temperature.—There is also in these cases a slight elevation of temperature, the normal range being from 99° to 100.5°. If the temperature reaches 102°, or more, it is almost diagnostic of some type of infection other than tuberculous. One sometimes finds a slight increase of temperature in the case of a very fretful child, but the condition rapidly subsides to the typical normal temperature after the elimination of the disturbing complications. The temperature curve is of great importance in that it differentiates the acute conditions, which may occur in childhood. A high temperature is never seen in uncomplicated tuberculosis, and when it does occur, its treatment and care take precedence over the tuberculous process.

X ray findings.—The x rays are relied upon by many clinicians for the determination of the presence of a tuberculous process, but they are of infinitely less importance in the diagnosis than the clinical examination. One should not attempt the decision in a case of this kind by an x ray plate, unless it is an unusually clear one, and if this has not been secured the patient should be returned to the röntgenologist for another exposure. In certain cases, an anesthetic must be administered before a clear picture of the involved structures can be secured. Absorption of bone substance is the typical picture, but if the lesion has its origin in the synovial parts of the joint and the epiphysis of the bone is clearly outlined, there will be found a wider space between the surface of the head and the acetabulum, because of the fluid in the joint cavity. There may also be found roughening of the surface of the cartilage of the head or of the acetabulum, but a plate must show minute details of structure to demonstrate this fact. After all is said and done, x rays are of secondary importance in the diagnosis, but they may corroborate the clinical findings.

The diagnosis, therefore, rests upon first, the history; second, the intermittent limp; third, muscle spasm; fourth, limitation of function in all directions; fifth, the position of the leg; sixth, atrophy of the muscles; seventh, apparent lengthening or shortening; eighth, referred pain; ninth, night cries; tenth, slight elevation of temperature, and eleventh, the x ray findings. The differential diagnosis in the presence of this group of symptoms becomes fairly easy, usually, and too great emphasis cannot be placed upon the importance of the physical examination.

There is one point in the examination to which special attention should be called, and that is the custom of many physicians in the examination of their patients to tap on the sole of the foot for the purpose of eliciting pain in the hip joint. This procedure cannot be too strongly condemned. It shows nothing which cannot be determined by careful manipulation of the parts, and may do damage to the hip joint. It elicits nothing beyond the fact that there is tenderness in the hip, and because of the danger of breaking down parts already weakened by disease, should never be employed.

DIFFERENTIAL DIAGNOSIS.

Rheumatism.—Probably the most common error in diagnosis in these cases concerns rheumatism. This is easily differentiated by the symptoms. It is a polyarticular condition, is more acute in its manifestations, is not very common in childhood, is more painful from the beginning and runs its course in from one to three weeks, especially under the influence of the salicylates. If there is any doubt in the mind of the physician regarding these two conditions, the child should be kept at rest and given a therapeutic test for the rheumatic condition, and if at the end of the two or three weeks, the temperature has not dropped to the normal and there is not free function in the joint, it should then be treated as the more serious condition. Furthermore, in close connection with it is the finding of a focus of infection in some portion of the body, such as the tonsils.

Growing pains.—Among the laity, the idea of growing pains still exists, and there is no doubt that a condition of hyperemia of the upper end of the femur may and does occur as the result of great activity in play. It does not amount to an actual congestion or rupture of the bloodvessels, and during the night the process subsides, the vessels resume their normal size and tone, and the patient is free from trouble until another period of functional traumatism occurs. This is the most plausible explanation of growing pains, and unless some injury sufficient to rupture the vessels in the part is sustained, no ill effects obtain from the condition.

Synovitis.—Acute synovitis is another condition which is sometimes mistaken for coxalgia. This is easily differentiated by the sudden and rapid onset following an injury or acute infection and by the acute symptoms which go with the process. The entire condition is an acute one, and under complete physical and functional rest, it quickly subsides. In certain cases, however, the acute process may merge into a chronic synovitis and when this occurs, the differentiation from tuberculosis becomes almost impossible, and the case must be treated as though it were tuberculous. If it is not of this type, recovery will take place within four to six months, under appropriate treatment, while the tuberculous process will extend over a period of years.

Genital irritation.—Another condition seen in both boys and girls is some limitation of function, from irritation of the genitalia, such as phimosis, vaginitis or adhesions between the hood and the clitoris. I have seen a number of cases in which the diagnosis was extremely difficult, but by the relief of the genital condition, all symptoms subsided, thus establishing the relationship between the local condition and the hip trouble. Usually, in this class of cases, the hip involvement is not constant. That is, one hip may be affected for a short period, and later the other one becomes involved, and this inconstancy of the symptoms is very suspicious of the reflex nature of the trouble.

Epiphyseal infection.—Acute infection of the epiphysis, such as occurs after acute injuries or during the course of scarlet fever, pneumonia, diphtheria, and other acute processes, is easily differentiated from the tuberculous process by the severity of the symptoms. It presents a group of symptoms entirely at variance with those outlined in the tuberculous process. Pus forms early, and the abscess is acute, instead of the chronic, cold type of the tuberculous condition. This type of infection, of course, requires prompt surgical treatment, while the hip joint abscesss does not.

Acute rickets.—This disease is often accompanied by extreme pain in one or many joints, and as this condition is seen most frequently prior to two years of age, the physician should always be suspicious of the origin of the trouble, and should inquire carefully into the feeding. A common history is that the child is fed with condensed milk or some form of patented food substitutes over a long period of time, or that it is getting a too dilute milk formula. The acute pain in more than one joint, the fretfulness of the child, the history of the feeding and above all, the change of food formula, with the administration of hypophosphites and some of the fats will clear up the case in a week's time.

Infantile scurvy.—Very much the same picture is presented here as in rickets, though in the more advanced cases, the x ray will often show extensive hemorrhages under the periosteum of the long bones. There is also the condition of the gums, and in the severe cases, petechial hemorrhages, to confirm the diagnosis. Here also a change in feeding will verify the diagnosis in a few days.

Psoas muscle contraction.—Contraction of the psoas muscle from the presence of disease in the dorsolumbar or lumbar spine, and even from the presence of an appendiceal abscess, may prove confusing. The leg is held in a position of flexion and cannot be straightened. The differential diagnosis is easily made by still further flexing the leg on the abdomen and then testing the movements of the joint, and where there is merely involvement of the psoas and iliacus muscles, the joint will be found entirely free in the position of complete flexion, while in hip joint disease, further flexion of the leg will not be possible.

Disease of spine and knee.—Diseases of the spine and of the knee are sometimes confused with trouble in the hip, and one should always bear in mind the well known injunction, "In every case of painful hip, examine the spine, and in every case of painful knee, examine the hip." Not infrequently the orthopedic surgeon is called to see a patient suffering from pain in the knee, who is being treated by ointments, ice bags, and even plaster casts, by the family physician, and finds, upon examination, that the trouble is in the hip and that all pain is referred to the knee joint.

Coxa vara.—This is the last condition to be mentioned which presents difficulty in diagnosis. It is an alteration of the angle between the neck and shaft of the femur from 135° to 100° or perhaps 90°, and occurs in a rapidly growing child of from eight to twelve years of age, who usually is extremely stout and heavy. In these patients a limp develops, usually without a history of injury, and there is practically no complaint of pain or other disability. Examination of the part, however, shows no atrophy and limitation of motion only in the position of abduction. The other movements of the joint are practically normal, though if extreme movements are attempted, some pain may be elicited. The x ray is of the greatest possible value in these cases, and will show the alteration in the angle of the neck with more or less softening of the head and neck of the femur. This picture is not seen in tuberculosis but the condition requires treatment similar to that of the tuberculous infection. The weight of the patient on the diseased part tends to increase the deformity, but after solidification takes place, the patient has a permanent limp.

A number of other conditions might be mentioned which may be confused with hip joint disease, but as such confusion could only result from failure to examine the patient, they will not be considered.

Recurrent Lobar Pneumonia

By W. GILMAN THOMPSON, M. D.,

New York.

In the voluminous literature of lobar pneumonia, little mention is made of the frequency of recurrence of the disease in the same person, yet such instances are by no means uncommon. I do not refer to those cases observed particularly during the prevalence of influenza epidemics in which a second attack may appear after a few weeks or months and before the patient has fully regained his strength, but to a second or third attack which may take place in those who have been in vigorous health for a year or two between the attacks. One occasionally meets with patients quite advanced in years who survive successive seizures of this sort, but the following described case is of exceptional type in that the disease recurred in a robust man thirty-five years of age in three successive years (during which there was no influenza), the interval between the first and second attacks being eighteen months and between the second and third attacks thirteen months. In each attack the physical signs and mode of onset were absolutely typical of the ordinary acute lobar pneumonia with chill, pain in the chest, cyanosis, rusty sputum, dyspnea and a leucocytosis ranging from 19,000 to 25,000.

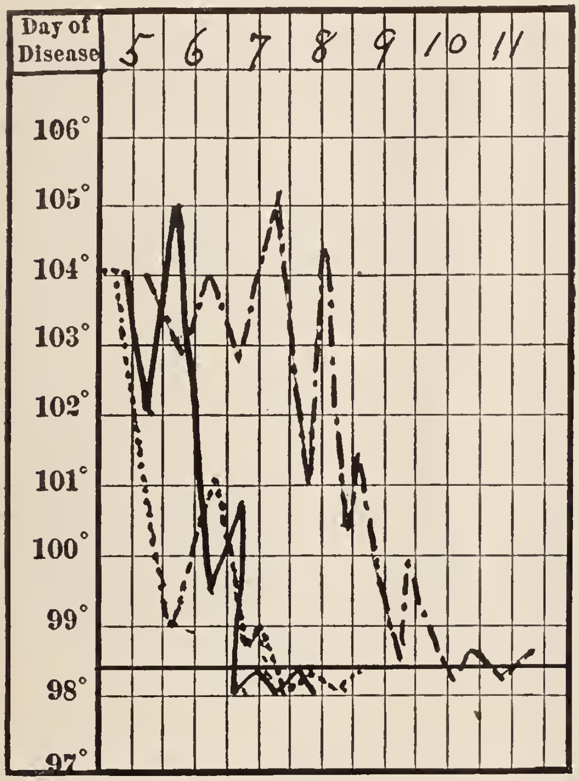

Fig. 1.—Solid black line, first attack; dotted line, second attack; dots and dashes, third attack.

In the first two attacks, a typical crisis took place upon the sixth day in the first attack, and the fifth day in the second attack, so that when the third attack came the patient's attendants in the hospital stood, watch in hand, awaiting another crisis, but it did not appear and the subsidence was by lysis, from the eighth to the tenth day (Fig. 1). The first two attacks involved the left lower lobe and the third, in which subsidence was by lysis, the right upper lobe.

This variation in mode of subsidence of recurrent pneumonia in the same patient is again shown by the accompanying chart (Fig. 2). The attacks occurred in a young man twenty-four years of age with an interval of eleven months between them during which he remained in robust health. In the first attack the crisis occurred on the fifth day with extraordinary abruptness, the fall of temperature amounting to 8° F. in twelve hours and being followed, as is usual in such cases where the temperature becomes markedly subnormal, by a rebound of one or two degrees above the normal for a couple of days, which recalls the behavior of sunstroke cases where the high temperature is suddenly reduced to subnormal, and which seems to indicate rather a slow readjustment of the heat regulating mechanism of the body, than any more serious condition. In this instance the second attack, lasting eight days, was followed by a similar, but slower crisis with a fall in temperature also of nearly 8° F. but with a less decided and more brief rebound above the normal.

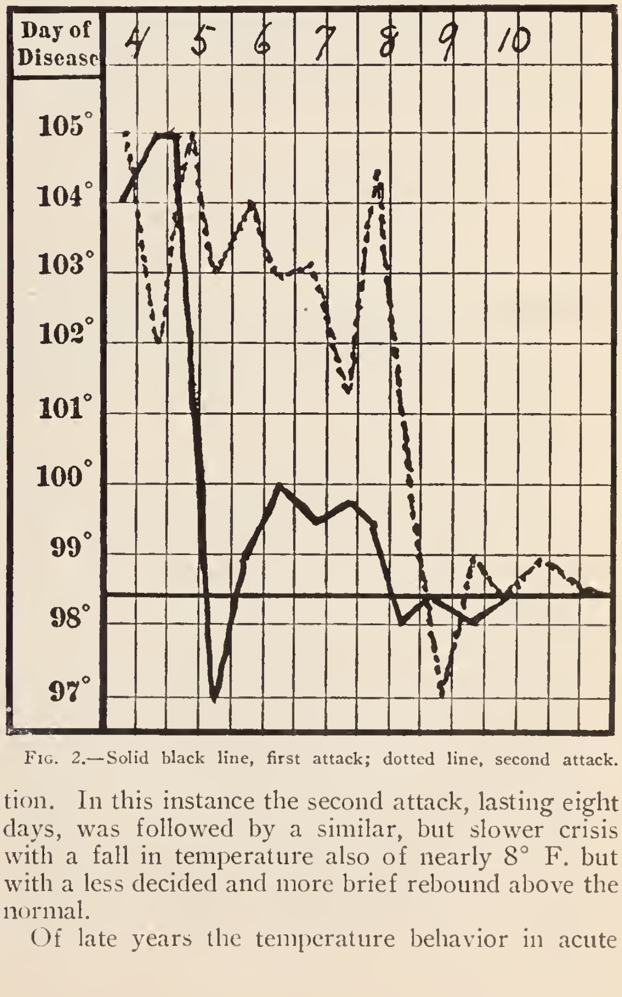

Fig. 2.—Solid black line, first attack; dotted line, second attack.

Of late years the temperature behavior in acute lobar pneumonia has rightly come to be regarded of less importance than many of the other symptoms of toxemia, so that usually it is no longer combatted by antipyretic measures. It is, nevertheless, of great interest in relation to the phenomena of hyperpyrexia in general and for this reason these unusual cases are recorded.

142 East Sixty-second Street.

Pneumonia*

By A. C. MORGAN, M.D.,
Philadelphia.

Pneumonia is endemic in this section of the country, and at this season the disease may be expected to reach epidemic proportions. In a large majority of cases of pneumonia in recent years there have been premonitory symptoms of influenza or a grippy cold, lasting for three or four days before the ushering in of the active pneumonic stage. Judging from the history of former cycles of influenza it is not to be expected that a great increase in the number of cases will occur during the present winter.

Each case of influenza, however mild it may seem at first, should be looked upon as a case of potential pneumonia. The symptoms at the onset may be only those of a grippy cold, during which the patient may not take much care of himself; or, they may be more severe and cause him to remain at home and in bed. In the case that eventuates into pneumonia there need not be very pronounced symptoms at the beginning. If a heavy chill, marked myalgia, unusual prostration, or persistent cough are present at the onset, or should develop, there is great danger of impending pneumonia.

The usual course is that of prompt response to early treatment directed toward breaking up the cold, and the patient may soon become restless if kept under too much restraint. However, in the presence of these symptoms we dare not relax our diligence too early. Just here is where the patient may commit some act of indiscretion, such as walking about the room, going into a cold hall, the bath room, downstairs to meals and the like, exposing himself to the danger of a chill, which may quickly terminate in an active pneumonia.

To delay the diagnosis and treatment of pneumonia until the classical symptoms and physical signs are present is often a grievous error. The physical signs during the grippy stage are often those of a severe bronchitis, with the presence of coarse râles, fairly evenly distributed all over the chest. When a pneumonia supervenes there will be noted the appearance of râles of smaller calibre with a tendency to become more numerous in certain areas. The percussion note becomes impaired, and signs of pleurisy may now be present. In forty-eight hours the physical signs of consolidation are well manifested and the symptoms indicate the height of the disease. The heart at this time may be slightly accelerated in action with accentuation of the second pulmonic sound and a fair degree of muscular tone is present. Later on, and sometimes with great rapidity, the heart tones, rate and rhythm may become seriously embarrassed. Collateral pulmonary edema is always to be noted, and when present is always to be looked upon as an indication for active stimulation of the heart.

The treatment of a case of lobar pneumonia should be carried out along definite lines of procedure. It is unwise to adopt any narrow course. Far better is it to size up each individual case, as determined by the history, environment, personal equation of the patient, and his reaction to treatment, and to act accordingly.

The matter of hospital care should be settled early. If it is decided to treat the patient in a hospital he can be safely transported in an ambulance during the first day or two without much fear of deleterious effect upon the heart. However, if the disease has progressed to the fourth or fifth day, or later, there is great danger that the nervous fear, physical exhaustion, exposure and handling of the patient may induce a cardiac collapse, and it is debatable whether the good that may result from hospitalization may not be negatived by the injurious effect upon the heart and nervous system.

Fresh air is an absolute requisite in the treatment of lobar pneumonia. The very young and the old cannot always stand the rigors of very cold weather, but this can be overcome by having a low degree of heat supplied to the room but at the same time keeping the windows open constantly, without permitting a direct draft to blow upon the patient. If the patient had much myalgia at the onset, or should this develop at any time, he would do better in a warmed atmosphere, though the supply of air must be constantly renewed.

The patient must be kept in bed in the position which he finds most comfortable. He must be watched day and night and not be permitted to exert physical effort for fear of cardiac overstrain and also to anticipate the development of ambulatory delirium, which is frequently noted in these cases.

The diet should be bland and easily digestible, avoiding all articles of food that may predispose to fermentation. The appetite is usually lost but the patient will be grateful for liquids which may be given in the form of fruit juices, plain water, coffee, tea, cocoa, and the like. Inasmuch as the course is brief the patient will not be seriously affected if he does not partake of substantial food for a few days. Coaltar products should be avoided. Their use in the early stage of the grippy condition may be permitted for the purpose of promoting analgesia and diaphoresis, but they should be discontinued once their effects have been established. It is well to clean out the gastrointestinal tract at the beginning, but drastic purges must be avoided during the height of the pneumonia as a tendency to collapse may accompany frequent bowel movements at that time. Simple enemas will usually be sufficient to unload the lower bowel.

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*Read at a meeting of the Logan Medical Society, Philadelphia, November 18, 1921.

Aside from the specific serum that may be employed in Type I pneumonia there is no established rule with regard to the indications for this form of treatment. The mountain of literature which has accumulated during the past few years seems to show that the most enthusiastic claims made for the beneficial effects of serum treatment are those that emanate from workers in the laboratories, but whose findings have not yet been corroborated or confirmed at the bedside.

The heart should be carefully studied from the beginning. The previous history of the patient will give us some clue as to any previous damage that had been sustained, as an endocarditis, mechanical overwork, alcoholic or nicotine excesses, or other etiological factors. Small doses of digitalis, started early, seem to have the happy effect of conserving the power of the heart and to decrease the all too frequent tendency to dilatation, such as may result after a severe coughing spell, straining at stool, excitement or sudden exertion. In case of emergency, or where the heart is found to be flagging, the size of the dose may be increased. Hypodermic injection may be employed but caution must be observed in giving the drug in this manner, as many patients complain of local soreness for a long time afterward. Other drugs that are of great value are pituitrin, adrenalin, caffeine, atropine, camphor oil, and strychnine. Each has its special indication. If a drug having only a transient effect, such as adrenalin or camphor, is used, another drug with more lasting action, such as pituitrin or atropine, should be given in a short time following the use of the former. Do not overdo in the matter of cardiac stimulation, as the heart often suffers from too much as well as from too little care.

Tympanites is a dreaded complication in pneumonia. Its appearance and extent will aid us in measuring the severity of the given case, more especially the virulence of the toxines, as they act upon the vasomotor supply to the intestinal muscularis, causing a partial or total paresis of the muscle coats of the bowel. The delayed peristalsis resulting from this dangerous condition favors the progress of intestinal putrefaction and fermentation, thus aggravating the distention of the bowels and interfering mechanically with the action of the diaphragm; this in turn prevents the venous circulation in the lungs and adds to the danger of an already overworked right ventricle becoming too sorely taxed beyond its powers to maintain compensation and thus pulmonary edema will develop, with its usually fatal outcome.

Insomnia is frequent and must not be permitted to continue as the nervous energy of the patient will soon become exhausted if he does not secure much needed rest of mind and body. Sedatives either by mouth or hypodermic injection should be employed in these cases.

The limits of this paper will not permit detailed discussion of symptomatic treatment. The idea has been to direct attention to the salient points in the management of pneumonia, with special emphasis upon broad general principles that should find ready application in each case.

2018 CHESTNUT STREET.

Treatment of Focal Infection of the Throat by X Ray Compared with Surgical Removal of Tonsils and Adenoids

By W. D. WITHERBEE, M. D.,
New York.

The x ray method of treating chronic focal infection of the throat, namely, tonsils and adenoids, is not only safe and permanent, but will more thoroughly and completely remove this focal infection than any other method yet devised, surgical or otherwise, and furthermore, the contraindications for operation in no way interfere with this procedure.

The technic is comparatively simple. In the average case we use a seven inch spark gap, five milliamperes, four minutes time, ten inch distance, and three mm. of aluminum as filter. The patient lies face downward, head turned to the side, the position and angle of the patient and tube corresponding exactly to that employed by the röntgenologist in making a radiograph of the lower molars on an x ray plate (Fig. 1). The number of treatments is usually about eight, given at intervals of two weeks, and both sides of the head are exposed at each treatment. A special table and board (Fig. 2), have been devised for the treatment of children.

The principle upon which this method is based might be stated as follows: Both lymphatic and embryonic tissues are more easily destroyed by the x ray than any other living cell. The tonsil consists mainly of lymph tissue. The small fibroid tonsil so commonly associated with rheumatism contains lymph follicles, the greater part of which is embryonic tissue as evidenced by the mitotic figures. The embryonic tissue in the follicles of the large lymph tonsil is considerably less than is found in the fibroid tonsil. The remainder of the tissue in these follicles consists of mature lymphocytes. Therefore it is possible to use very small doses of x ray to promote the absorption of the lymphatic element of the tonsil which will in no way interfere with any of the surrounding and adjacent cells or glands.

From the viewpoint of infection the shrinkage of the tonsil and lymph tissue of the lateral and posterior walls of the throat (Fig. 3) by x ray will produce a drainage and relieve the distortion of the crypts throughout the entire mucous membrane which is impossible by any known operative procedure. Out of thirty-six cases in which specimens from the crypts were taken thirty-two showed an absence of hemolytic streptococcus and hemolytic staphylococcus. This coincides with the results which have so long been obtained in acne vulgaris and also the results first obtained by Dr. Kennon Dunham, of Cincinnati, in the treatment of carbuncle. Recently Dr. Hickey, of Detroit, has carried out this treatment in a series of diphtheria carriers in which he was able to rid the throat of diphtheria baccilli in from two to four days and this occurred in eighty per cent. of the cases treated.

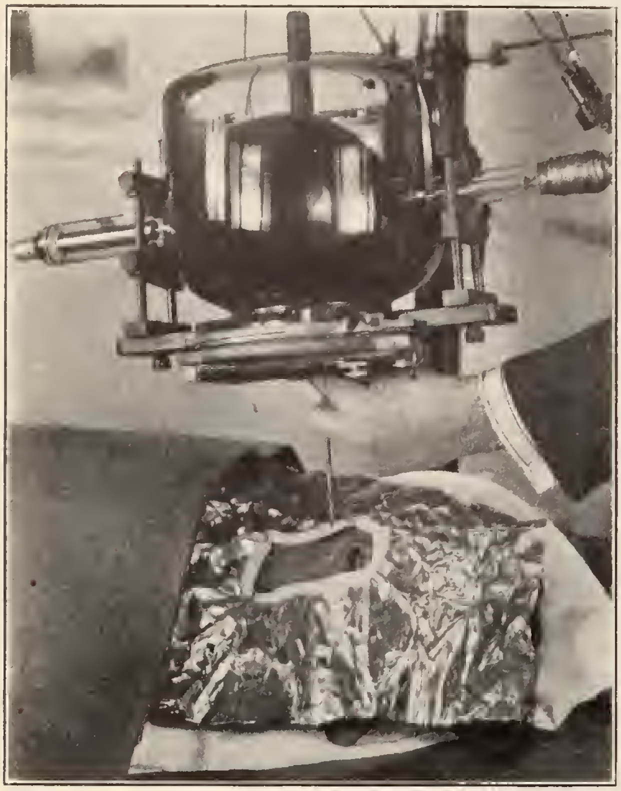

Fig. 1.—Illustrates the use of the indicator in determining the distance and direction of the ray, showing area exposed and position of the patient. Routine factors with this apparatus as follows: Seven inch spark gap, five milliamperes, ten inch distance, four minutes time, with three mm. of aluminum as filter.

This method, as compared with surgical removal of tonsils and adenoids, is free from serious complications. Following surgical removal one may have all the conditions which arise from circulating septic emboli; lung abscess, empyema, phlebitis, endocarditis, hemorrhage, middle ear infection and mastoiditis may also complicate recovery. In the x ray treatment there are no known complications provided the technic is faithfully carried out. The permanency of the results, as well as the safety of this method, can easily be checked up by any man who in the past ten years had had a number of tuberculous glands of the neck treated by x ray. Van Allen's recent report of fifty cases is most interesting and instructive. (1)

The same technic, so far as the factors are concerned, is used in the treatment of tuberculous glands of the neck and toxic goitre, the only difference being in the area exposed; in the goitre case we expose both the tonsil and the thyroid gland, and in the tuberculous gland, the tonsils and glands involved. Whether an infected throat has anything to do with the toxic goitre is a debatable point. However, I have seen one patient sent into the hospital with an acute follicular tonsillitis which in forty-eight hours presented all the symptoms of toxic goitre. If the infected has anything to do with the action of the thyroid gland we might expect better results in these cases if the focal infection in the throat is relieved, as well as the effect of the ray on the gland itself. In tuberculous glands of the neck the removal of the focal infection in the tonsil and throat will also relieve the primary focus of infection and thus have more lasting results on the effect of the tuberculous gland.

The objections so far encountered to the x ray method have been, first, the dangers of x ray, namely, a burn. This is impossible if the technic prescribed is carried out. The possibility of injury to the parotid, the thyroid, the pituitary, and other adjacent glands has been amply tested in the past ten years in which tuberculous glands of the neck have been treated by much larger doses, some of the patients receiving as high as forty doses, whereas the dose for tonsils and adenoids has never exceeded fourteen treatments in any given case in a series of nearly five hundred cases which we have treated in the past two years.

We have encountered two cases of concealed abscess of the tonsil in our series of five hundred cases, revealed by the shrinkage of the tonsil. Both patients were suffering from rheumatism and in both instances the rheumatism was relieved in the early part of the treatment. These abscesses are completely circumscribed and walled off by fibrous tissues and are therefore inert. In one of the cases the abscess ruptured and drained about three months after treatment. *The fibrous tissue remaining after x ray treatment and the incapsulation of these abs-*

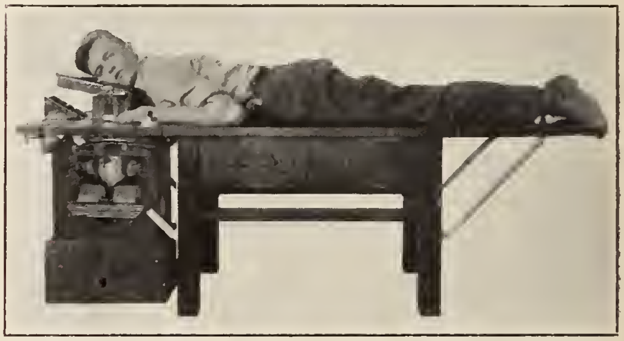

Fig. 2.—This table eliminates the danger of overhead high tension wires, and is especially adapted to the treatment of children. The adult dose consists of the following factors: Five and a half inch spark gap, five milliamperes, ten inch distance, five minutes time, with two mm. of aluminum as filter. Time of exposure diminished in proportion to the age of the child.

cesses point out the fact that we leave only that type of tissue which nature utilizes in her defense against infection. This method is especially indicated in chronically infected throats in vocalists, since the muscular reconstruction of the throat is minimum as compared with that following surgical removal of tonsils and adenoids; also in those cases associated with rheumatism, chorea, diabetes, chronic endocarditis, hemophilia, or any condition contraindicating operation.

REFERENCES.

1. VAN ALLEN: *Journal of Radiology,* December, 1921.
2. MURPHY, WITHERBEE, CRAIG, HUSSEY, and STURM: The Atrophy of Hypertrophied Tonsils and Adenoids and other Lymphoid Structures of the Throat Induced by Small Doses of X Ray, *Jour. A. M. A.,* January 22, 1921
3. WITHERBEE: X Ray Treatment of Tonsils and Adenoids, *American Journal of Röntgenology,* January, 1921.
4. *Idem:* The Principles Involved in the X Ray Treatment of Tonsils, NEW YORK MEDICAL JOURNAL, March 16, 1921.
5. MURPHY, WITHERBEE, CRAIG, HUSSEY, and STURM: The Effect of Small Doses of X Ray on Hypertrophied Tonsils and other Lymphoid Structures of the Nasopharynx, *Journal of Experimental Medicine,* June, 1921.

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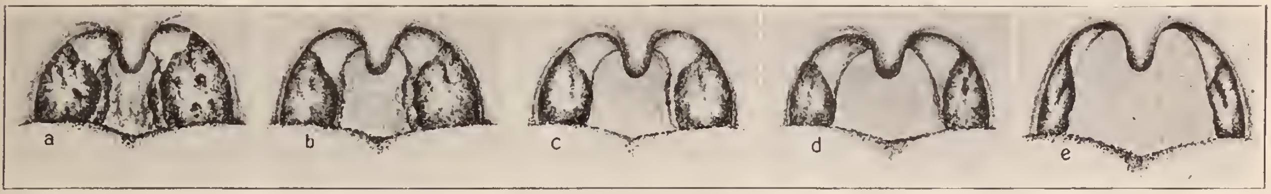

FIG. 3.—a, Tonsils before x ray treatment; large, ragged; crypts contain pus; large mass of lymphoid tissue behind posterior pillars. b, Two weeks after treatment; tonsils reduced; surface smooth and clean; mass behind pillars reduced. c, Four weeks after treatment; tonsils markedly reduced; pale and smooth; no exudate on deep pressure. d, Eight weeks after treatment; small amount of exudate. e, Six months after treatment; tonsils small, normal in appearance; no exudate on deep pressure. Lymphoid tissue behind pillars practically gone. Hemolytic streptococci disappeared from throat by second week after treatment.

Group Diagnosis[*]

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DEFINITION OF GROUP DIAGNOSIS.

Group diagnosis is a concrete opinion or conclusion from collaborated examinations wherein symptoms, obscure or apparently conflicting, have been clarified or reconciled.

NECESSITY FOR GROUP DIAGNOSIS.

The necessity for group diagnosis may be predicated upon, first, the utter impossibility of a single human intelligence compassing more than the smallest fraction of medical knowledge; second, because of the multitude of facts the utmost difficulty arises in coordinating them into wisdom, nor hardly ever can be wholly utilized this comprehensible fraction, because seldom used or isolated facts lose their proper values; third, knowledge possessed by the few, but not common to the general, may be needed to avoid error and prevent erroneous deductions from inexact or insufficient data. These things are inherent to finite intelligence, but in the multitude of counsellors there is safety.

Inherent also to human fallibility there enters another factor and that is the tendency to accept the most obvious diagnostic solution with an honest but frequently mistaken conviction of its truth. It is difficult for the human mind to entertain more than one fact at a time and that two diseases may be concurrent or that the symptoms may be due wholly to an unrecognized third, is seldom comprehended, notwithstanding that this is not infrequently the case. The human body is a complicated mechanism containing within itself a laboratory wherein goes on chemical processes still more complex. It is not in the nature of things that we shall ever wholly comprehend the chemism of these reactions, for the methods whereby we attempt to grasp them can, and possibly do, defeat their own purpose. We are adding daily to our knowledge, but some alleged phenomena are artefacts, some assertions are unproven, many are untrue. Much of value is being learned but in the face of the immensity of truth even the stoutest stand appalled at their own paltry portion.

To complete the argument for group diagnosis there are to be considered factors incident to disease itself, to weigh which and to give them proper values demand investigation from many angles. There are no textbook disorders; descriptions of these are like composite photographs. Effects arise from apparently irrelevant and unrecognized causes—almost no disease presents a classical cleancut syndrome—and, incident to those of a serious nature, constitutional and remote disturbances arise to cloud the clinical picture. If each specific ailment presented always the same symptoms, if like causes always induced like results, if but one disease could be present at a time, if disorders in one did not often modify functions in other and remote organs, even to the point of overshadowing the original source of trouble, and, lastly, if man were omniscient or infallible, there would be no necessity for group diagnosis.

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[*] This essay was the winner, in competition, of the prizes offered by the New York Diagnostic Society. Part IV, detailing building construction, interior facilities and diagnostic equipment, has been omitted on account of lack of space. It will be published in another journal.

These suppositions, however, can never admit of violation and, furthermore, if we admit, as we must, that only upon correct diagnosis can intelligent or effective treatment be based, then must follow that group diagnosis is absolutely necessary. It is not a matter of general knowledge that with all appliances and means to boot, a small percentage of our diagnostic problems are incapable of solution, nor does the average physician realize how large is the proportion solvable with difficulty and then only after a searching investigation of every organ and body fluid. To approach so abstruse a problem single handed is to invite failure and possible disaster. To attempt its solution through separate and dissociate examinations by independent workers does not offer the highest prospect of success, for the road to the largest proportion of accurate diagnoses lies through associate and collaborate investigations by experts working together for the common good. To attain a maximum efficiency is our duty, and if human life has any economic value we owe this to the State; if health and wellbeing are worth conserving we owe it to our patients; if medicine is to be progressive we owe it to our profession; and if we value our selfrespect and love our work we owe it to ourselves.

PROPER TYPES OF CASES FOR GROUP DIAGNOSIS.

With diffidence is approached the question as to what constitutes the proper type of cases for group diagnosis. This depends upon whether we regard it from the sociological or the purely medical viewpoint. The form of the question, while it does not exclude the first, implies the second, but let us consider the primal phase, not as a digression altogether, for the logical application of group diagnosis must comprise the one as well as the other. If we are "to push the issue of the fact to its ultimate conclusion in unmitigated act" the proper subjects for group diagnosis are those who are apparently in robust health.

The frank and obvious symptoms of disease, with lesions in a state of far advanced and often in terminal functional insufficiencies, are those that chiefly impress the eye. It is not at this stage, however, but in the earlier and initiatory period, in which are presented only vague or minor symptoms, such as may precede by years the ultimate breakdown or the fatal issue, that the diagnostician will find his field of greatest usefulness. We might to our advantage emulate the Chinese, who pay physicians to keep them in good health and who stop their emoluments as soon as any illness develops. The great life insurance companies have already put into execution a plan (which cooperative group diagnosis would further elaborate) that offers to its policy holders a semiannual examination whereby may be detected disease in its incipiency and wherefrom may be formulated measures aimed to prevent further development. This is not pure altruism but a cold business proposition, as they have found that these methods pay dividends in greater longevity. It would seem, therefore, the acme of common sense to give this plan a wider application. If men in general could be made to understand that health is their greatest asset and that, barring certain limitations, it may be theirs for the seeking, then would follow not only a higher level of efficiency and wellbeing, but a lengthened measure of the span of life. Twice yearly should be taken account of stock and the balance struck between assets and liabilities. On the debit side of the ledger may be, 1, any developmental defects or hereditary anomalies; 2, residua of previous illnesses; 3, latent and unsuspected infections; 4, lowered status of the body defences, and 5, disturbances of the equilibrium of metabolism. To guard against breakdown, Nature works on a large coefficient of safety. The cardiac musculature holds five sixths in reserve, the pulmonary area is largely in excess of our respiratory needs, one kidney alone will suffice for ordinary elimination through this channel, and the great central reservoir of nervous energy is like a huge storage battery fully charged to meet any extraordinary demand which may be made upon its neural outflow. Not until these resources are drawn upon to the limits of safety do frank and evident manifestations of disease obtrude themselves alike upon physician and patient.

The beneficent provisions of Nature, which provides these safeguards to our wellbeing, by their very nature fail to give warning of minor disturbances, for as soon as these occur, compensation sets in or reserves are drawn upon to restore the balance of functional activity. It is here, to him who seeks to know his margin of safety or to what extent have drafts been made upon his sanitary balance, that group diagnosis intervenes to detect by its methods of precision the physically unnoticed evidences of incipient disorder. The urine may show both to chemical and microscopical analyses absolute normality, but the hematologist may report a high nitrogen content of the blood which tells us that, despite the urinary findings, for this particular patient there exists a renal inadequacy. A Wassermann test may reveal unsuspected syphilis or a cell count of the blood give evidence of a lowered vitality. Long before precordial distress or slight dyspnea on exertion points unmistakably to cardiac disorder the cardiologist can detect, by his instruments of precision, the beginning disturbances of function.

High blood pressure has become a popular fetich with the laity—and with not a few physicians. By this is meant high systolic tension, but not infrequently it is low systolic and high diastolic (100 mm.+) which give the first warning of beginning interstitial nephritis. Arteriosclerosis is not a disease *per se*, but appears to be a late manifestation of larval syphilis or of autotoxemia and, in the latter event the presclerotic stage of vascular hypertension goes hand in hand with indol and skatol in the feces or a urine rich in indican or the acetone bodies. The polygraph, the cardiograph and the radiograph, figuratively speaking, open the chest wall for us to see the heart in motion and make evident to the eye conditions, not of themselves necessarily dangerous or threatening but which are, as morbid phenomena, strongly suggestive of a toxemia or of structural degeneration. Suspicions awakened by these findings must be verified or disproved by a thorough investigation into the bodily status.

To the alert and trained clinician no case presents greater difficulties in analysis or in diagnosis than the one in which symptoms are vague, of apparently minor import and where the interrogations elicit only the history of general malaise. While it is true that this may be simply the expression of transient and unimportant disturbance of function, yet one can never be sure without thorough research that underlying and incipient organic lesions may not be at the root of the matter. Here it is most essential that group diagnosis be utilized to the full. The general practitioner reads into a case like this his own interpretation based on his individual knowledge and experiences and rightly or wrongly translates the symptoms into terms with which he is familiar. It is perfectly logical and not to his discredit that he may wholly overlook essential features, unobtrusive in themselves, but which would be at once evident to one trained along other lines. For example, the neurologist might see in the hardly noticeable tremor or the slurring speech that which will arouse his suspicions even in the face of the euphoria or exalted hopefulness of the paretic who perhaps comes for an associate but minor ailment. To the dermatologist, an inconspicuous eruption would convey information totally hidden from the untrained observer. One skilled in diseases of the eye would note at once the small and sluggish pupils of the tabetic and at a time when this might be the only symptom of the disease. A multitude of instances might be cited of equal portent but the point to be emphasized is that only by collaboration can all the facts be elicited and only by coordination can their relative values be determined.

It is not to be assumed, nor does it logically follow, that because group diagnosis has been urged upon those in apparent health that all persons who are frankly ill and with manifest evidences of disease should be made subject to the same measures. The larger percentage of human ailments present no difficulties in diagnosis but, on an ascending scale, as we draw near and nearer the one hundredth point greater obstacles are encountered, until in the last five these are unsurmountable. It is in the upper moiety of the scale that is needed collaborative effort and every aid that science owns to help.

Too often it is assumed that what is of importance is the specific nomenclature which particularizes the type or group in which the disease belongs. This is the least part of diagnosis and were every label erased all that would be lost would be convenience of description, but to an immeasurable gain in our comprehension of disease. What it is essential to know is, first, the nature of the morbific process; second, the location of the disease and whether this is single or in multiple foci; third, the collateral or remote organic disturbances; fourth, the environmental or occupational influences; fifth, the coefficients of compensatory defences; sixth, the transmitted and hereditary inadequacies; and seventh, the morbidic trend of the disease. This is diagnosis in its true and comprehensive sense and all chronic obscure or evidently serious disorders should have this searching scrutiny of direct and indirect causes, the investigation of effects manifest or otherwise, and a rigid analysis of probable sequences. It is not within the power of a single brain to compass all these things, nor perhaps can all of human knowledge, but by bringing to bear the sum of many intelligences the closer can we come to fusing these diverse elements into a composite entity.

PROPER CONDUCT OF A GROUP DIAGNOSTIC CLINIC.

The proper conduct of a group diagnostic clinic has many phases outside of the one purely medical, but under this caption only the latter will be considered. Assuming that the case is one suitable for collaborative study what should be the initiatory step and progressive sequence in the investigation? After the introductory record of name, residence, occupation, age, sex and social status, the patient goes to the examiner in chief who, up to the completion of the investigation, shall be in full control of the case and to whom shall come the reports from all the other departments. Suggestions, which are invited from the men working along their individual lines, shall be acted upon only as these coordinate with reports from other special examiners and which may be needed to clarify obscurities. He shall be the general to whose plan of action all else shall be subordinate. From him alone shall issue orders as to what examinations are to be made and he shall receive immediate reports of these so that as the investigation develops it may either be curtailed, should a conclusion be evident, or extended to meet such exigencies as may arise.

Preliminary to the special and detailed examinations, the history is taken which should cover the chief complaint and all of the essentials of the familial, past and present medical features. Advisedly is stress laid upon essentials. To take a history which shall elicit all of these and omit nothing of importance is the most difficult of all arts, and he who excels in this must have not only the widest possible medical knowledge but also possess an intimate acquaintance with every form of human endeavor. He must be courteous, tactful, firm, patient, and possess that second sight which is called intuition, but which, in truth, is tuition carried to so high a pitch of excellence that the intermediate mental steps, out of which culminates percipience, are lost sight of in the process. Born of this faculty are mentally tabulated data drawn from the facial expression, the color of the skin, apparent to actual age, the character of the speech, the attitude in repose, the condition of the apparel, the rhythm of respiration, and from these there gradually crystallizes the thought which shall direct the lines of detailed scrutiny into their proper channels. The pulse, respiration and temperature are taken at this time, as well as the systolic and diastolic blood pressures. The patient is then conducted to a dressing room and returns robed only in a special gown, thin and washable, taken from a sterile container. His height, weight, and chest girth (both in forced inspiration and expiration) are recorded and in his going to and from the dressing room notice is taken of any disturbances of gait or posture. In the taking of the anamnesis the office nurse records questions and answers stenographically. The chief examiner should not take this upon himself, either in long hand or shorthand for these reasons: it is useless expenditure of time, and, more important, it breaks the continuity of thought by transferring it to the physical and mental act of writing. If by chance the patient should object to the presence of a third person in the room or should show embarrassment, the nurse is dismissed, but in her own private office continues the recording by means of a dictaphone connection between the two rooms.

The physical examination of the patient should follow. An operating chair is used, as often it is of advantage to change from the sitting to the recumbent posture or even to place the patient at an incline with head lowered. The region under examination is bared. Beginning with the head is noted, its shape; oxycephaly, leontiasis, dolichocephaly, acromegaly, myxedema; the hair, whether sparse or abundant, harsh or brittle, of premature grayness, or if areas of alopecia are present. The feel, moisture or dryness, color, or blemishes on the skin are observed. The brightness of the eyes, color of sclera, state of the pupils, the ocular pareses, nystagmus or exophthalmus, the puffiness of the lids. The lines at the root of the nose, the play of the nostrils, freedom or otherwise of nasal respiration. Rhagades at the angle of the lips, if the mouth be lax or firmly closed, the conditions of the gums and teeth, the appearance of the tongue, palpability of the cervical glands, and the size of the thyroid. If there be any nasal or aural discharges these will be detected by their odor, likewise any alteration in the character of the breath. The chest is gone over with equal carefulness and by inspection, palpation, auscultation and percussion an estimate is made of the integrity or otherwise of the contained viscera. The abdomen is inspected for distention, collateral venous circulation, the scars of past operations, for healed lesions of the skin, or the presence of any active eruption. It is palpated and percussed for possible neoplasms or the presence of ascites; note is taken of the area of spleen and liver dulness or the presence of a full bladder. The hands and feet are examined for any evidences of disease; the joints are tested for motility or tenderness, and the entire body, including the anal orifice and the genital organs, scrutinized for any abnormality.

Throughout this preliminary investigation the chief examiner should be receptive to fresh impressions and alert to elicit new facts and he dictates to the office nurse his observations, which are made part of the history. The chief aim of all this is not the acquisition of complete and exact data (these will come in later from the special departments), but only so many as shall determine into what specific division or group the case belongs and what are the indications for detailed and specialized examinations.

Following the physical examination the patient, clad only in the dressing gown, goes to the x ray room for fluoroscopy of the chest and to the laboratory where blood is taken for a Wassermann, for other complement fixation tests, for the hemoglobin content, the cell counts and the differential. The urine is also collected for the first rough tests of any gross anomalies. If there is cough with expectoration, the sputum and any other discharges are collected for cultural and microscopic analysis. If a neurological examination is clearly indicated this is made before the patient returns to the dressing room. The examination of the eye, ear, nose and throat completes the routine for that day. The reports from these departments will reach the central office before the closing hour and will be made part of the dossier of that patient.

The chief examiner is now in possession of such data as will enable him to form a general estimate of the patient's condition and what further investigations are needed. It is to be noted that the hypothetical case under consideration is one of obscurity and in which searching analysis is necessary. It must also be noted that up to this point no attempt has been made at integration of the data or the exercise of the critical faculty. These would be premature and should be reserved for the synthesis, the final stage, when the multitude of component parts have been collected, to be placed together to complete the mosaic. Many of these pieces may have to be rejected, between others there may be a choice, some may not fit into the vacant spaces, but at the end an harmonious assemblage composes the clinical picture.

This analogue is happily chosen. Diagnosis does not consist of a single part but of many, and it takes time to put them together. It may chance that what has been done is sufficient and that on collating the data an opinion covering comprehensively the case can be given. This does not mean simply giving the disease a name, but comprises, 1, the trend of the known etiological factors; 2, the nature and the sequence of the pathological changes; 3, the collateral disturbance in organs of associate functions; 4, the possible existence of other and concurrent ailments. If, on the other hand, the data acquired do not point to a satisfactory elucidation, further search must be made until this is attained or the conclusion reached that the problem is insoluble. Rarely will the latter be reached if, under modern diagnostic methods, every avenue of investigation is explored.

The greatest sources of diagnostic errors are ignorance of what modern methods and instruments of precision are capable of showing; a natural precipitancy in seizing upon the obvious, wholly overlooking lesions which may be of even greater importance, and lastly, what is most essential, failing to take sufficient time and care without which good work is impossible. With the proper tools, with skilled workmen exercising care, without haste and with pride in their work, the finished product must reach the highest point of excellence. What applies in the industrial world applies equally to the medical, and a unity of skilled clinicians working harmoniously, with the same methods, can attain the fullest measure of success, in that most fascinating of all studies —medical diagnosis.

GENERAL CONSIDERATIONS.

When a patient is to be subjected to the elaborate detail which is necessary to a complete examination of every organ, function, and metabolic process, a system of record and procedure must be instituted, which shall not only comprise a permanent registry of the investigation but which shall serve, as this progresses, to give aid and help to each investigator, to act as a check on unnecessary procedures, and to be a guide to such as are essential. This system must be comprehensive in that it is to cover both the business and medical phases. When the patient enters he goes to the business office where the registrar makes note on a separate entry card of the name, address, telephone number, age, sex, social status, object of the visit, whether a placement, complete or a euphoric examination, address of the referring physician, or, if the patient comes at his own initiative, the name and address of the physician to whom the case is referred. A list follows of the several departments with space before each for check marks, and space after each for the examiner's initials, to show that their respective examinations have been made. A separate smaller filing card is made out omitting the medical listings, but leaving space for recording the financial transactions and other notes pertinent to the case in other relations. This card is then given a serial number and placed in the business index.

After an appointment has been made with the chief examiner, the patient is given his entry card and appointment slip, upon which the several departments are listed with space opposite each for times of examination. When the chief examiner has covered the preliminaries he checks off such departments that he thinks essential, communicates with these for convenient hours, and the further examination proceeds in proper sequence. The entry card, together with the history and record from the chief examiner, is now put into a large envelope and given in charge of the waiting room nurse; she hands this to the examiner in each department, receives from him his special report, adds this to the others, and so progresses until the patient's dossier is complete in her division. If the patient is to go to other waiting rooms, she sees that the records are transferred to the nurse there in charge. At no time has the patient opportunity to look into what has been written.

At the close of the day's examination the envelope with its contents is placed on the desk of the chief examiner. Each examiner is provided with his own special blanks, drawn to his own specifications, all of uniform size but each differing from the others typographically and in the spacings to meet the varying needs of each specialist. Under each caption of the abnormal, the normal relation shall be printed for the sake of comparison. Every physician knows these relations in his own specialty but cannot be expected to know them in all the others. By so contrasting them, not only are given him clues to the patient's disorder, but an efficient help to a proper decision along his own line. More than this, the referring physician, when he receives his copy of the records can the more readily comprehend them. Where conditions can be better shown graphically, rubber stamps are provided suitable for such delineation, e. g., the ear drum, the thoracic viscera, the fundus oculi, the osseous structure, and spaces are left on the blanks upon which to impress these. At the bottom of the record sheets are printed, "therapeutic suggestions," "examination suggestions," "tentative diagnosis," and spaces left wherein may be written the examiner's opinions. When the examinations are finished, the contents of the envelope form a complete record of the patient's condition. The reports which analyze the phases of the bodily status are now subject to the synthesis which rejects the unessential, reconciles apparently conflicting symptoms, clarifies obscurities and builds up not a picture of "disease," but sets forth in detail the portrayal of the pathological sequence in its multiform aspects.

GROUP CONSULTATIONS.

The necessity for group consultation is a corollary to group diagnosis. Its proper purpose and how such consultations should be conducted will next receive consideration. In the first place, to give a name to a disorder does not constitute a diagnosis, nor in so doing is the proper function of group consultation fulfilled. That the welfare of the patient may be conserved and the physician guided to this end, a diagnosis should comprise: First, the nature and sequence of the pathological process; second, the trend of the known etiological factors; third, the collateral organic disturbances; fourth, the single or multiple location of the disease, and fifth, the morbidic trend of the disorder.

Associated with these major factors is the evaluation of occupational, hereditary, or environmental influences and also should be considered the possibility of a concurrent ailment. A group consultation should review these in the order named. It is evident that this comprehensive judgment cannot be arrived at except by a composite opinion, nor solely by a synthesis; however accurate this may be, it requires more—a prophetic insight and this is born only of encyclopedic knowledge. No man possesses this, nor is it possible to any group of men however able they may be, but because the ideal is unattainable none the less should we strive to reach it.

The method of procedure of a group consultation should be an assembly of every investigator who has been associated in the case, excepting such whose reports have been negative. Their attendance is optional, not obligatory, as it is assumed that their special knowledge has no bearing upon, nor would it throw light upon the particular case under investigation. The röntgenologist and the laboratory technicians are always made part of the group. This meeting takes place in the library where charts, models, and books of reference are at hand for immediate use if needed. The medical director presides at this meeting; he reads the history to his colleagues and dictates to his stenographer the essentials under their respective headings and the result of the physical examination, as far as this departs from the normal and is pertinent to the inquiry. The stenographer transcribes and transfers these essentials to a large blackboard and under such captions as chief complaint, family history, past diseases, present ailment, and subcaptions of inception, duration, and progress. The results of the physical examination are subscribed under objective and regional headings, e.g., heart, apex beat in fifth intercostal space, aortic second sound accentuated. Naturally under the foregoing titles are added the essential facts from every other department, including the laboratory findings.

The object of all this is that every man present may have before him a visual synopsis to supplement the aural, which by its very length invites lapses of memory of what might prove to be essential features. Appended to this chart are the tentative diagnoses by the members of the staff. When a reasonable time has been given for reflection, the medical director invites each member, in turn, to give his reasons for his tentative diagnosis and how this may be reconciled with the facts as elicited. A majority may have agreed upon a tentative diagnosis, and in this event the minority are given the opportunity to express their reasons for differing. A vote is then taken, if this fails in unanimity by at least two votes, such voters are asked to bring in a minority report. If all are agreed upon the diagnosis, and by this is meant simply the designation of the disease, e.g., multiple sclerosis, myocardial degeneration, cirrhosis of the liver, etc., then the council proceeds to the consideration and discussion thereon of the cardinal features as previously designated. An abstract is then made which covers causes, immediate and remote effects, and the probable sequences and consequences. These are embodied in a summary, together with therapeutic, hygienic and dietetic suggestions. The discussions stenographically noted are made part of the clinical records, but are not included in the report to the referring physician. This résumé, as outlined above, portrays the true clinical picture in which the perspective shows the salient features in their proper relationship.

SUMMARY.

The proper type of cases for group diagnosis may be summarized in five words—the sick and the well. The matter covering plans, conduct, general considerations and group consultations in itself summarizes diagnostic technic, housing, facilities, and methods of application. The plaintiff rests on these propositions but the necessity for group diagnosis, collaborative practice, and the education of the rising generation to a recognition of this is so imperative that the writer approaches with diffidence the discussion of a matter so vital to the future of medicine. To begin with, our whole concept of the nature of disease needs a complete revision. It should be clearly understood that whatever influences may be brought to bear by hygiene or education the ultimate decision rests with the germ cells as to man's physical destiny. As Sir Clifford Allbutt puts it, "Diseases are not entities or even recurrent phases of independent events, but partial aspects of a universal series." It needs collaborative thinking and a scrutiny from many angles to get a clear concept of these aspects of a pathological sequence. Cooperative practice can never supplant individualism, nor can it arrogate to itself the function of the general practitioner. He it is who meets first any deviation from normality and initiates scrutiny of causes.

The first variation is an aberration of molecular dynamics, but man is no nearer the truth because he bottles it in a test tube or magnifies it under a microscope. The voice of the laboratory, which is science speaking, must be confirmed by the verdict of the clinic which is experience deciding. The general practitioner's proper place is at the head of a group and individualism, which is cerebration expressed in conduct, must ever govern its action. Groups do not think collectively; it needs the integration of the associated thought to make effective its conjoint knowledge. Man's intellect has a limit of capacity beyond which it cannot go and this limitation precludes the possibility of grasping unaided the multiform phases of disturbed vital processes. Correct judgment can come only from a coordination of all the essential data and these no single mind can compass. The *zeitgeist* has breathed upon the dry bones and these have become a thing of life: collaborative medicine is already here and in widely separate communities groups are being formed for cooperative practice and diagnosis.

While not wholly pertinent, it is collateral to this discussion to consider the absorption by the State of the practice of medicine. If it can, as it has done, arrogate to itself police powers over conditions which threaten the health of the population in the mass, it is a logical conclusion that it may do this for the individual. The writer does not presume to stand in judgment upon the wisdom or otherwise of this possible outcome, but they who oppose it should take heed to the impetus this movement is being given by the people at large. "You cannot fool all the people all the time" and the gross incompetence of much of medical practice is not only being recognized by the laity but they are crying out for a remedy. There remains a choice between the only two solutions to this imminent problem, one is medical State control and the other is collaborate medicine. The latter in the smaller communities may be attained through associate collaboration by a few men and in the larger cities by a medical union, the membership of which centralizes in a diagnostic clinic. The young man entering practice today is confronted with overwhelming difficulties. If he possesses ability he associates himself with hospitals and dispensaries, but here he is likely to meet with petty jealousies and to have his efforts to collaborate with his fellows in diagnosis frustrated by the absence of team work or nullified by his inability to reconcile conflicting opinions. If the initiate belongs in the ranks of mediocrity and elects to go alone he is either appalled by the mass of things unlearned or so lacking in the recognition of this fact, that in either event he develops a mental torpor through the haze of which, he makes his alleged diagnosis (from obvious symptoms only) and bases his fictitious treatment upon the directions in a pharmacist's catalogue. To both types of mind neither of these courses offers a satisfactory line of action, nor in either are the essentials of scientific medicine fulfilled. Let us be honest with ourselves. No man with a spoonful of brains is satisfied with himself nor with the manner in which medicine is practised under present methods. Progress and reform are rarely endogenous, but in the face of conditions which now confront us, from this direction, they must come or the alternate exogenous emendation will leave, of the present medical structure, not one stone standing upon another.

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A Reply to Certain Antagonistic Criticism of Nonsurgical Biliary Tract Drainage

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PART I.

Since this method of nonsurgically attacking gall tract problems diagnostically and therapeutically was formally presented by me in September, 1919, I have published a series of papers (1) outlining the principles upon which this method is based, carrying the subject through the technic which I urge should be adhered to for safeguarding more accurate differential diagnosis, emphasizing again and again the need of earlier diagnosis of gall tract disease (which can be obtained by this method) if we are to make headway in its treatment, calling attention to the possibilities of taking further steps in the prevention of gallstones, and late gall tract pathology, and, finally, giving a classification and citation of cases which represent the group of gallbladder and gall duct and liver disease in which it has a proper field of practical therapeutics. At first the field of treatment by this method was approached with a properly cautious conservatism until our experience grew and our records had developed some really brilliant recoveries. Now much more can appropriately be said. Following the introduction of any new method which tends to revolutionize certain of our firmly established conceptions, and particularly a method so pregnant with future possibilities as is this one, it is not unnatural that it should have awakened widespread interest and after its adoption should have brought out free discussion.

During the past two and a half years this method has been carefully watched, freely discussed and criticized, and finally widely adopted. The literature has testified to the growing interest of and the encouraging results obtained by those men who have become really familiar with the method and who have given it thoughtful consideration. Most of the men more recently writing on this subject have confirmed the soundness of the principles upon which this method of diagnosis and treatment rests—Brown (2), Smithies (3), Whipple (4), Simon (5), Sachs (6), Friedenwald (7), Synnott (8), Levin (32), Kohn (33), Niles (34) and others. Perhaps it is not wise for me to say that these men have *experimentally* confirmed the soundness of the fundamental principles of this method. Yet they have shown interesting and conclusive confirmation of most of the statements which I have already published. On the other hand, certain writers (Einhorn, Crohn et al, Dunn and Connell, Bassler et al), as a result of their experimental observations, have attacked the very roots of the method, although in their writings it also becomes clear that they have likewise confirmed a number of the observations which I mentioned in earlier papers. Certain of these published criticisms are so important as to require careful answering. This I propose to do, and shall attempt without bias to set forth a clear exposition of their attitude and shall attempt to show how it is wrong. No one is more interested than I am to determine the scientific truth of this method. If it is fundamentally wrong the sooner the better this can be realized and corrected, for the striking beneficial results to be gained from its use must then be explained on other theoretical principles.

After reviewing the writings of these critics I believe it is pertinent to say that they are attempting to draw counterconclusions as a result of a misinterpretation of their findings, which are based upon series of cases either insufficiently studied or too small to permit them to realize their errors, or because they have attempted to modify the original technic usually in the direction of shortening the time and lessening the labor involved in a diagnostic or therapeutic medical drainage of the gall tract. In other words, they are not really performing a diagnostic drainage as it should be done in order to obtain the maximum diagnostic evidence. This method cannot be diagnostically simplified without grave danger of error. In the future, as we extend our knowledge of physiological chemistry of the bile, it may have to be still further elaborated.

Fundamentally this method falls within the field of gastroenterology, and gastroenterology in turn must be the handmaiden of a sound and extensive general and clinical knowledge which has grown out of preliminary years of work in the laboratory, out patient service, hospital wards, and private practice. The diagnostics of this kind of work can be best developed by the gastrointestinal clinician who has a sound scheme of general and special diagnosis, who preferably either does his own laboratory work or sees that it is done by personally trained technicians and who makes a daily point of insisting that all laboratory specimens be examined immediately, and routinely tested microscopically, culturally, and bacteriologically. You will say this is highly specialized work and requires unusual specialistic knowledge. This is true. This is no field of diagnosis for the tyro, nor can it be simply or successfully done by house doctors or nurses in the wards and the materials then turned over to the general laboratory unless the various people engaged in this division of labor are properly trained and have a thorough understanding of what each one's part shall be, and unless the whole scheme of such organization, whether in the office or in the hospital, is sufficiently supervised and coordinated. Much of the criticism that has come about is due to a disregard of these facts. In diagnosis and treatment in this particular field there is just the same difference between the veriest beginner and the man who by patient day by day plodding has become an expert, as there is between the relatively untrained hospital intern who may occasionally successfully handle an acute surgical emergency and the fully rounded surgeon who has acquired a Deaveresque mastery of his art.

Medical internists seeking to accomplish a real success in their nonsurgical management of gastric and duodenal ulcers, gall tract and intestinal disease which we are now learning must be technically and topically treated rather than extensively (and often uselessly) drugged, would do well to follow the example of the surgeons who have gradually trained their hospital groups to a definite detail of technic not only in their operating rooms but extending into their surgical wards.[1]

Let me now present for your consideration an analysis of the criticisms of the chief antagonists to this method in the order of their publication. All of these several critics attacked the method at its vital point, namely, that it is not possible by the use of magnesium sulphate locally introduced to empty the gallbladder of its fluid contents; in other words, that we cannot medically drain the gallbladder.

PART II.

Max Einhorn, of New York, bases his contention upon his observations in the use of magnesium sulphate, as well as numerous other salts and other substances, including sodium sulphate, sodium citrate, sodium chloride, magnesium citrate, sodium bicarbonate, calomel, mercurochrome, peptone and glucose solutions (and to this list Bassler has added hydrochloric acid), and states that when solutions of any of these substances are locally introduced into the duodenum that in varying degrees they encourage a flow of bile from the common duct and in varying degrees give rise to a play of colors from light to dark and back to light again, as I have described in my A, B, C sequence. These points I have never denied, but have even previously to Einhorn's publications, and again since then, studied the effect of all of the substances he mentions, and in addition a number of other socalled cholagogue or secretogogue groups, and I came to the conclusion that of them all magnesium sulphate had, first, the greatest power to relax the duodenal wall, and, if not by specifically relaxing Oddi's socalled sphincter, at least by releasing the pressure on the common duct as it diagonally perforates the duodenal wall, permits bile to be discharged from the common duct; and, secondly, that of all these substances magnesium sulphate acted best in its delivery of the dark, certainly the darkest, colored B bile, and apparently has a chemical hormonic influence upon the gallbladder musculature which the others do not possess in a like degree. I find that a solution of peptone, representing one of the true physiological hormones, comes next in the series, and that hydrochloric acid (and nitrohydrochloric acid), used by Bassler in his argument, then follows. Hydrochloric acid, no doubt, acts as a stimulant to secretogogic activity of the liver, by converting prosecretin into secretin, and I agree with Bassler that this increases the velocity of bile discharged, but I contend that this action more concerns the liver than the gallbladder, and that it does not give rise to the same delivery of the dark bile, which (with certain exceptions to be mentioned later), I maintain is derived in large part from the gallbladder.

Max Einhorn, in his second paper on this subject (9), says: "In a paper recently published (10) it was shown, as first stated by Lyon, that magnesium sulphate when injected into the duodenum usually provoked a color reaction in the bile. The reaction in most instances takes place gradually, reaches an acme of color intensity (becoming very dark), then step by step diminishes, returning to a light yellow. The dark bile did not appear to be real gallbladder bile as Lyon assumed for the following reasons.

"1. If the color change of the bile was due to the action of the magnesium sulphate on the gallbladder, causing an emptying of its contents, the change of color would necessarily be an abrupt one, beginning and ending sharply. This is not ordinarily the case."

Comment.—There is obviously no soundness to this argument unless applied to a gallbladder wall possessing a normal tonus, and under a certain degree of tension. Under such circumstances the transition from A to B bile may be abrupt, and may, indeed, occur as the first bile of recovery, especially in cases in which we find Oddi's sphincter relaxed when we reach the duodenum. Furthermore, the gallbladder possesses a normal tonus and as its fluid contents are not large, it often possesses the power to empty itelf as a result of a single stimulation with magnesium sulphate, and the transition to the light lemon C bile is then quite abrupt and further stimulations will not recover any additional dark bile. This first argument of Einhorn certainly cannot apply to the functional state of atony of various degrees, in which the gallbladder musculature is so lacking in tonus as neither promptly to deliver its bile, causing a sharp or gradual transition from A to B, nor to empty itself completely and it may require a series of stimulations before this result is achieved. During the intervals between the expulsion of the darker gallbladder bile the lighter liver bile will be collected. Again this argument is not tenable in pathological states of partial obstruction of the cystic duct, especially when accompanied by a deficient *vis á tergo* from a weakened gallbladder wall. Why should the dark bile, in either of these conditions, have to appear abruptly and to disappear abruptly in order to be considered gallbladder bile? It would be more logical to expect it would not.

"2. Magnesium sulphate, which is believed by Meltzer (11) to relax Oddi's sphincter, and by Lyon to cause the emptying of the gallbladder, would in this way have no direct effect on the character of the bile evacuated. Solutions of twenty-five per cent. or ten per cent. of magnesium sulphate would, if the emptying of the gallbladder is accomplished, furnish a bile of identical color and other qualities. This, however, is not the case. The stronger the magnesium sulphate solution the darker the color and higher the specific gravity of the bile, indicating that the magnesium sulphate has a direct influence on the bile itself."

Comment.—In the first place, in my personal work I do not allow the magnesium sulphate to be retained, but use it largely for the purpose of stimulation only and recover by gravity siphonage from sixty to eighty per cent. of the amount introduced, so that, as a rule, the amount retained is small. Secondly, I do not get an increased amount of the dark bile in proportion to the amount of magnesium sulphate retained. Thirdly, in not a few instances I have recovered dark bile in a sudden gush without using any magnesium sulphate or any other chemical. These cases are comparatively rarely seen and occur in patients presenting clinical symptoms suggestive of gallbladder distention or in jaundiced patients without complete bile obstruction, and in both of these groups of cases the gastric acidity has been found high and more frequently than usual is discharging spurts of this high acid gastric juice into the duodenum. This observation is in accord with the theory of the hormonic effect of the gastric fluid, which is still further augmented when acting upon proteins.

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[1] The three foregoing paragraphs are included in a paper to appear in the March number of the *Pennsylvania State Medical Journal* but bear repetition here.

The very fact that Einhorn assumes that solutions of various strengths of magnesium sulphate should furnish a bile of identical color and other qualities is an argument in favor of my contention. It is true that weaker solutions of magnesium sulphate will not deliver as much of the dark colored bile as will stronger solutions. I have tried this salt in five per cent. volumetric solutions up to complete saturation, but believe that, for practical purposes, after we pass a thirty-three per cent. volumetric solution the gallbladder response to higher strengths is relatively so little greater as not to warrant their use. Einhorn in the paragraph above confirms this statement when he says "the stronger the magnesium sulphate solution the darker the color and the higher the specific gravity of the bile."

In regard to making any deductions as to the presence of gallbladder bile by estimating its specific gravity after the use of magnesium sulphate, I am entirely in agreement with Bassler that this is a waste of time, even though the specific gravity readings are made after the magnesium sulphate has been entirely precipitated out of the bile solution by the addition of barium hydrate, which Einhorn did not do. The specific gravity of the bile will naturally be increased by the concentration of the contained magnesium sulphate, nevertheless I find that it is true that as a rule the specific gravity of the darker gallbladder bile is higher than the liver biles, and even higher than the more static biles occasionally encountered in the common duct, if such biles are tested before stimulating with magnesium sulphate or introducing any other fluid or chemical substance into the duodenum. In this I find my work in agreement with the experimental work of Rous and McMasters (12), whose observations have shown that one of the chief functions of the gallbladder is to concentrate the bile after it is received from the liver. These authors hold that the normal gallbladder can concentrate nearly ten times its volume of liver bile.

"3. A great many of the salts (which have no relaxing action), like sodium sulphate, bicarbonate of soda and other chemicals act in a manner similar to that of magnesium sulphate, affecting the color reactions named above. The latter must be due to the action of these ingredients on the liver and the bile production, and not to a mere evacuation of the gallbladder contents."

Comment.—As I have stated above, many of these salts do act "in a manner similar" to that of magnesium sulphate, but by no means have they the same power to deliver as much or as dark a colored bile, because they do not influence the gallbladder musculature to such a degree.

"4. After applying the magnesium sulphate test an immediate repetition of the test frequently provokes a reiteration of the same reaction with its entire series of color plays. If the dark bile would be gallbladder bile the reaction could not take place anew right after the gallbladder had emptied its contents."

Comment.—I have already answered and shown the fallaciousness of this view in my comment after Einhorn's first argument, and have shown that it is possible for such a sequence to take place in conditions of atony of the gallbladder or of partial obstruction of the cystic duct.

"5. Patients whose gallbladders have been removed frequently give similar reactions after magnesium sulphate instillation, clearly showing that the gallbladder as such can have nothing to do with this phenomenon of color changes in the bile."

Comment.—This observation is both right and wrong. It is wrong in the fact that, so far in over eight thousand observations, I have never seen a cholecystectomized patient delivering the extreme shades of deep green black bile which appear so frequently in patients still retaining their gallbladders, and particularly in those patients who show the greater degrees of atony, or in those patients who at operation are found to have small but incompletely fibrosed gallbladders, but which still contain small amounts of thick, dark olive green or tarry black bile. Einhorn's observation is right, and my comment here applies equally well to Bassler, who also uses this argument, that not infrequently the cholecystectomized patient will deliver a darker colored bile that resembles either the deeper shades of normal gallbladder bile or, at times, even a greater depth of color. I have found that in the occasional cholecystectomized patient from whom I have recovered a bile dark enough to resemble B bile that this phenomenon has occurred only in the cases with jaundice (more often chronic jaundice which produces marked swarthiness of the skin due to slow absorption of bile poisons), caused by biliary obstruction in the finer hepatic bile radicals, or it has occurred in cases in which at secondary operation the common and hepatic ducts were found dilated and containing static bile, or in whom diverticuli had occurred. This latter fact is in accordance with the observations of Sweet (13) and his coworkers, who found that in dogs upon which they had made a high ligation of the cystic duct, in the postmortem studies several weeks or months later they were able to demonstrate in a number of their animals a definite dilatation had taken place at the end of the cut cystic duct, and that in such a dilated point they would find the bile darker and more static than in the rest of the ducts. Indeed this diverticulum in certain of their dogs seemed to approximate a regeneration of the gallbladder. Where the cystic duct had been ligated at its lower end, near its union with the hepatic duct, they found diverticuli might occur at any point within the hepatic or common duct, and not alone at the stump of the cystic duct.

To ascertain and acquire an adequate appreciation of these facts requires clinical experience with medical gall tract drainage covering several hundred cases. Isolated observations are often dangerous if put on record too soon. Indeed in the excellent study of the single case of hepatoduodenostomy, without a gallbladder or common duct and with shrunken hepatic ducts as reported by Dunn and Connell (14) you will find that the whole recitation of this case points to a well developed biliary congestion or biliary cirrhosis from long continued biliary obstruction, and would thus bear out my contention. This patient of Dunn and Connell's had had her gallbladder removed four months before coming to them, and during their handling of her case fourteen additional operative procedures on the gall tract were carried out, so that it would appear quite likely that the bile delivered through their fistula following the use of magnesium sulphate should be a dark bile due to stasis occurring within the liver itself. Their assertion that magnesium sulphate, when introduced into the jejunum, gave rise in this patient to a recovery of this dark bile is doubtless true. It probably would not matter at which part of the gastrointestinal tract (perhaps except the stomach) the magnesium sulphate was introduced, or even if it were introduced intravenously, for I should imagine the only type of bile they would recover from such a case might be a deeper colored bile occurring as a result of intrahepatic stasis. I have experimented with introducing the magnesium sulphate into the rectum with the tube in the duodenum, and find that it will deliver a transition of A, B, and C biles, but response in the production of B bile is by no means as great as occurs when this salt is introduced directly into the duodenum.

As I have stated earlier, I believe that a close reading of Rous and McMaster's papers (15) will show that they have conclusively demonstrated that the gallbladder possesses the function of concentrating liver bile in a higher degree than does any other part of the gall tract. They find that it will concentrate ten times its volume of liver bile. This provides the safety valve for the whole system. Otherwise spontaneous rupture of gallbladders would be more likely to occur, but when this functional capacity of the gallbladder has been exhausted or prevented some further concentration of bile can and does occur in the ducts.

They also found that they must obstruct from seventy-five to ninety-five per cent. of the total secreting surface of the liver before they can produce jaundice in their experimental animals. In the event of bile obstruction when the gallbladder has been ablated, its concentrating function as well as its storage function must be vicariously carried on by the ducts and later on by the liver.

It is to be noted that in this second paper of Einhorn's, which I have just discussed, he has receded from the position which he took in his first paper (10), in which he quite as strongly concluded that the dark colored bile was produced by an undefined action of the liver due to the absorption of the sulphate radical of the magnesium salt, and strengthened his conclusions by his observations that a similar but lesser play of colors could be produced by the use of sodium sulphate, and that this play of colors was produced in still less degree by sodium phosphate, sodium chloride, magnesium citrate and other salts which did not contain the sulphate radical. He has doubtless since become aware of the fallacy of this conclusion. Indeed it would seem that this should have occurred to Einhorn as not being the explanation when he stated in his first paper that "by injecting sixty c. c. of the peptone solution into the duodenum the bile outflow resembles very closely that after the magnesium sulphate. Here, too, the color play appears gradually and not abruptly." Of course, here he was using the normal physiological hormone as experimentally shown by Rost (16), and had he realized this he might have spared himself going on record with this erroneous deduction relative to the sulphate radical.

In looking over Einhorn's figures in his case reports I note that he reports practically all of his biles as being alkaline in reaction, and goes further to state their alkaline titer. I do not know by what methods he performed this work, nor what indicators he used, but it nevertheless surprises me, for I find that the bile is not, as a rule, an alkaline fluid, as has been so commonly stated, but is acid, and its acidity range I have found to vary between twenty-five and forty-five degrees of acidity when titrated to phenolphthalein. Fitz (17) of the Mayo Clinic has also noted this and further states that the gallbladder bile has a higher acidity than bile from any other portion of the tract. It is therefore surprising to find that such a well known authority on bile as Dr. Einhorn could have possibly missed this common and easily determined chemical property of bile. You will find that the acidity of the bile before stimulation with magnesium sulphate, while distinctly acid to the degrees I have stated above, when tested after stimulation will be found to have increased its acidity. Some of this is no doubt due to the magnesium salt, since the acid titer of the volumetric thirty-three per cent. solution averages about ten degrees, but in addition to this the increased acidity may be partly due to a greater expulsion of gallbladder bile. While the pure bile itself is acid to phthalein, it is probably due to its contained bile acids, for in no case has free hydrochloric acid been detected except where the bile is mixed with gastric juice.

In regard to the physical property of the specific gravity of bile, I have found that the range of specific gravity of bile entering the duodenum before stimulation by magnesium sulphate or by any other chemical varies between 1.013 and 1.040, and that here the color intensity and its specific gravity have a tendency to run more truly parallel, that is, that the deeper colored biles usually have a higher specific gravity. On the contrary, after testing them after duodenal instillation of magnesium sulphate I find that the color intensity of the bile and its specific gravity do not necessarily run parallel. The lemon C biles have been found in certain instances to have a higher specific gravity than the browns or green blacks. Where washing the duodenum has been practised to flush out the magnesium sulphate, in certain instances the terminal lemon yellows may contain more magnesium sulphate (when precipitated by barium hydroxide) than do the darker B biles. This is supportive evidence in favor that the magnesium sulphate may be absorbed into the portal blood stream and be carried to and eliminated again by way of the liver. The specific gravity of a volumetric thirty-three per cent. solution (actually a sixteen per cent. solution) of magnesium sulphate averages 1.120. Therefore it is natural to find the range of specific gravity of bile considerably higher after magnesium sulphate instillation.

Magnesium sulphate plus water plus barium hydroxide precipitates as magnesium hydrate and barium sulphate. This can be used as a quantitative test for determining the magnesium sulphate in bile as follows: 0.5 mils of bile and 9.5 mils of distilled water are mixed. Add one drop of a saturated solution of barium hydroxide. Magnesium sulphate is present when a heavy, curdy cloud is formed. The bile salts also go down as a finely granular precipitate. It is possible to reduce a bile of a specific gravity of 1.040 (after the use of magnesium sulphate) by the gradual addition of the barium solution to 1.003, leaving a crystal clear, colorless fluid. The barium hydrate apparently removes the bile pigment.

I believe these facts, in addition to what I have stated earlier, show the fallacy of Einhorn's first theory that the dark colored bile after stimulation with magnesium sulphate is due to the absorption of the sulphate radical by the liver. Furthermore, Dunn and Connell state their belief that the deepened color of the bile is due to the fact that the liver absorbs the magnesium and not the sulphate radical of magnesium sulphate. Of course, Einhorn and Dunn cannot both be right. I believe them both to be in error for the reasons stated above.

Dr. Einhorn, furthermore, considered that in view of his hypothesis magnesium sulphate might therefore be made a functional test for liver activity. Perhaps there is some better grounds for believing this, but more work must be presented before this can be accepted. Probably of all functional liver tests so far at our disposal, the recently introduced phenoltetrachlorphthalein test offers the greatest possibilities. This method, combined with the duodenal enzymic tests, as recently elaborated by McClure of Boston and his coworkers (18), may be very helpful to us in our better understanding of the physiological chemistry of the hepaticopancreaticogastroduodenal tract.

PART III.

Now let us consider the criticism of Crohn (31) and his associates. In their most admirable paper they have presented the results of their careful investigations into the premises upon which the rationale of this method is based. The appearance of such a paper as theirs should be welcomed because it shows the true investigative spirit and an attempt at a logical interpretation of the experimental data which they collected. Their conclusions are based upon a study of a series of cases, the actual number of which is small, and, even further, subject to doubt, for on page 1568 they state, "We therefore have attempted in a series of fifty or sixty clinical cases of gallbladder disease to gather data, etc." Here there is a twenty per cent. error, which is still further increased when on page 1570 I find them saying, "Of this series of seventy cases." Therefore it is natural to have a feeling of doubt as to the actual number of cases which they studied. This, however, is a comparatively small point.

They start out to establish a platform (?) that "the function of the test (Lyon's), and its therapeutic application, depend on the successful demonstration of all of these premises:"

"1. Demonstration of the presence of a functioning sphincter at the mouth of the common bile duct.

"2. Demonstration that rhythm and contractions of the gallbladder walls and simultaneous relaxation of the sphincter action at the papilla are both controlled by contrary acting systems of innervation.

"3. Evidence to show that magnesium salts cause relaxation of the smooth muscle of this sphincter when applied to the duodenal mucosa, and thus reflexly cause contractions and emptying of the gallbladder.

"4. Evidence that the fluid obtained is really gallbladder fluid, and that changes in color, consistency and amount indicate disease.

"5. Evidence that cytological, chemical and bacteriological examination of this fluid is both possible and feasible and leads to dependable conclusions regarding gallbladder pathology.

Comment.—Each of these five premises is not only fair, but, singly and collectively, failure to prove them would strike hard at the fundamental soundness of this method. They then proceed to discuss in detail each of these premises.

Premise I.—In regard to the presence or existence of a papillary sphincter. They review the work of Oddi (19), the Italian physiologist and surgeon, who in 1887 first described the augmentation of muscular bundles which occurred at the terminal portion of the common bile and pancreatic ducts ending at the papilla, and which have since been known as Oddi's sphincter. They then state Hendricksen's (20) confirmation of these findings, first on animals, and later in man. This has again been confirmed by Crohn and his coworkers (although they deny it), for they go on to say, "We have been able without difficulty to demonstrate microscopically in sections both in man and in the dog the existence of circular bands of smooth muscle fibres surrounding the common duct and its course through the intestinal wall. These transversely arranged bundles are continuations of the scanty musculature of the gallbladder and first and second portions of the common duct. In the third portion they are thicker and more numerous; yet at no point do they form a compact circular bundle or a substantial sphincter, such as is our conception, for example, of the sphincter of the pylorus or the anal ring. The fibres of the sphincter of Oddi are scanty, widely separated and diffused, and are at no time continuous. Nor are they collected in a band at any one point, but are scattered evenly throughout the intramural course of the duct. The real anatomic sphincter, apart and separate from the inner circular coat of the duodenal wall, can hardly be said to exist."

Comment.—Crohn gives the inference that they have not been able to confirm anatomically Oddi's sphincter, later confirmed by Hendricksen, yet a reading of the paragraph above will show that they have confirmed it. For why should they expect to find as much histological development of a sphincter in such a small tube as the common duct, designed to hold back a column of fluid under relatively low pressure (two to six inches of water), as would be expected of the pyloric sphincter which has to sustain a weight of one to several pounds when urged forward by the vigorous contractions of the more strongly muscled gastric wall, or indeed the anal sphincter which has to support the pressure from the intestinal column, and especially when placed at a point so vital to our existence in comfort without perpetual selfsoiling? Nature did not design us that way. However, these authors state that, aside from anatomical considerations, that "Physiologically, however, a sphincteric action at the papilla of water is demonstrable," and then proceed to quote the animal experiments of Mann (21), who demonstrated a resistance in the papilla equivalent to a pressure of a column of water of one hundred millimetres, whereas Herring and Simpson (22) found this resistance at the sphincter due to muscular tonus was equivalent to a column of water from two hundred to three hundred mm. in height. That the sphincter tonus is even stronger than this is suggested by the observations of Archibald (23) who found that it would sustain a force equivalent to about six hundred mm. of water pressure within the duct. In their experiments on dogs, in which they were aided by Dr. L. Auster, they (Crohn et al.) were able to confirm some of the earlier studies of Rost and noted "that during digestion in the dog the flow of bile from the papilla was slow but practically continuous and consisted of bile from the liver." They do not give any reasons, however, for believing that the bile was from the liver alone, unless it be that they did not see the gallbladder contract or otherwise empty itself, which is no reason, as I will show later.

Further they say that, "By drawing the finger even gently across the papilla, or by application of faradic stimulation or chemical irritants, it was seen that the sphincter promptly closed the duct. An interval of between ten and thirty seconds elapsed during which the papilla was erected like a mammary nipple. Then a relaxation took place, and the flow of bile was reestablished. Not only the papilla but also the surrounding segment of the duodenum responded to the stimulus. If the stimulus was strong enough, the whole segment became tonically contracted; if weaker, only the papilla and adjacent musculature. Thus we were able to demonstrate a definite sphincteric action, though not actually a certain anatomic sphincter."

Comment.—Therefore Premise I in regard to the presence or existence of a papillary sphincter seems to have been definitely established. Furthermore, in the last paragraph just quoted it is interesting to see how closely these experimental observations support certain clinical observations in regard to regurgitation of bile into the stomach brought about by reverse peristalsis as a result of direct duodenal irritation, or of reflex action of disease in neighborhood viscera, anatomically or neurologically connected. This tendency to biliary regurgitation I have clinically confirmed so repeatedly in cases of duodenitis, gastric and duodenal ulcer, cholecystitis and appendicitis.

Premise II.—Nervous control of contractile tissues of gallbladder and papilla. Here Crohn and his associates are attempting to disprove the "law of contrary innervation," as it was theoretically expounded by Meltzer (11), in its application to the biliary systems, and state that "this law, interpreted in terms of gallbladder and sphincter, would call for a double innervation, splanchnic and parasympathetic, to both the gallbladder and the papillary muscle. Thus, the same stimulus that traversed the vagus system to cause contraction of the gallbladder would simultaneously relax the sphincter; or, traveling through the splanchnic system, would contract the sphincter and relax the gallbladder. And they show that physiologists are not in accord in their results experimentally produced on animals by quoting the divergent conclusions reached by Doyon (24), and by Bainbridge and Dale (25), who repeated the same experiments eleven years later. They are, therefore, entirely right perhaps in saying, "A clearcut laboratory demonstration of the law of contrary innervation as applied in this field remains to be desired." But they go on to say that, "It is more than likely, however, that some such regulatory apparatus does exist, similar to that in the intestinal tract, ureter, esophagus, etc."

Comment.—Meltzer was aware of this for he says in his thesis that the innervation of the concerned parts is not yet settled in its details and then proceeds to quote Doyon's findings. But surely all theoretical reasoning, as well as numerous clinical observations of human beings in health and disease, point to such a mechanism, even though it has not been experimentally confirmed. Nor will it, in my judgment, be experimentally confirmed unless the experimental physiologist deviates from the methods provided by legal vivisection and does not narcotize to pain insensibility his experimental animals. This change in method cannot and should not take place, but even were it done there would still be the question of accounting for the abolition of these physiological reflexes by the cutting of the splanchnic or the terminations of the parasympathetic innervation, by incising the duodenal wall or by cutting the gallbladder in order to insert the customary balloons. This abolition of the normal reflex has been shown to take place by Rost (*ibid*) as well as by now countless postoperative observations of surgeons and others who find that after cholecystectomies the crossed innervation must be injured because the sphincteric control is abolished and bile is being constantly discharged into the duodenum.

This now brings me to a discussion of one of the strongest arguments advanced by Crohn. They state that, "In the experiments performed with Dr. Auster, we injected into the bladder cavity of dogs narcotized with chlorbutanol, a small quantity of a solution of methylene blue in physiological sodium chloride solution. This we did to differentiate gallbladder bile from the flow of liver bile. The duodenum was then opened and the papilla exposed for observation. It was noted that though the flow of bile is almost continuous after a meal, this bile consists entirely of liver bile, the blue discolored gallbladder bile not appearing at all except when manually expressed. Cholagogues and solutions of salines and peptones had a tendency to encourage this flow of liver bile; but we found no agent (presumably this includes magnesium sulphate), applied in the duodenum, that caused the expulsion of the gallbladder contents."

Comment.—This is an important statement for which some explanation must be furnished. This experiment of theirs is similar to experiments which we have conducted at the operating table on patients in whom a duodenal tube has been passed to the proper point prior to anesthesia, and with the abdomen open no visible contraction of the gallbladder could be observed following the local application of magnesium sulphate to the duodenum given through the tube. Nor could the darker colored bile be recovered until after the gallbladder had been emptied by manual pressure. I well remember my intense disappointment, nearly two years ago, at this failure of demonstration of Meltzer's law in my first participation in such an experiment on a patient operated by Dr. George G. Schwartz, and I confess then that my belief in the fundamental soundness of this method was shaken until I had had time to think. In my comments now I shall attempt to answer not only the argument of Crohn, but also that of Luckett, the surgeon who appears as a cocontributor in the paper of Bassler (26). The first question which might naturally arise is how great a part does the third stage of anesthesia play in inhibiting the reflex activity of unstriped muscle? We know that in full anesthesia all reflexes are abolished and that the true physiological function of any of the hollow viscera has not been finally fixed by any study of anesthetized laboratory animals of which I am aware. We also have much accumulated clinical evidence that this theoretical antagonistic innervation of the gallbladder is a mechanism which is easily upset, and it seems but natural then that it would be obtunded or abolished by a general anesthetic. I see no possibility of proving this point until the physiologists have come to some definite agreement in their findings. At present this situation is still *sub judice*. Perhaps clinical or laboratory experiments conducted under local anesthesia might give different results from those recorded above. But here we would still have to reckon with the difficulties of interpretation following an abolition of these physiological reflexes due to injury to the terminal nerve supply of the duodenum and gallbladder by surgical cutting or trauma from manually or instrumentally exposing the field and handling the viscera. However, in both Crohn's and Bassler's papers, by these very experiments they go far to establish the validity of my conception that magnesium sulphate, when applied locally to the duodenum, is more nearly a true chemical hormone for gallbladder expulsion than is any other chemical, for you will note that in Crohn's experiment they were not able to demonstrate the appearance of methylene blue until after they had manually compressed the gallbladder, and in each of the six operative experiments conducted by Luckett it is to be expressly noted that after manually compressing the gallbladder the darkest colored bile was obtained by aspiration. Luckett's experience is entirely similar to that of my own in the experiments which I have attempted with Schwartz and other surgeons. This very fact of the recovery of the darkest bile after manual pressure of the gallbladder should entirely contravert the assumption of Einhorn that the darker colored bile is derivable from the liver and not from the gallbladder. That magnesium sulphate applied locally to the duodenum under such anesthetic and operative conditions should fail to produce an A, B, C sequence is not surprising in view of what I have said above in regard to the effect of anesthesia and injury. Nevertheless the manual expression of the darker bile directly from the gallbladder is so similar to that recovered by the magnesium sulphate method when applied to normal human beings, nonnarcotized and nontraumatized, as to lend further corroboration that magnesium sulphate acts for this purpose better than does any other chemical.

Finally, we have to consider the fact that Sachs (6) has apparently first succeeded in successfully visualizing gallbladder evacuation where all the others have failed. In his recently published paper he reports the following case:

"Case.—Mrs. A. H. Referred by Dr. G. Simanek. Medical drainage three days prior to operation showed A bile a light golden yellow; B bile a dark static bile; C bile a light, lemon yellow. Through the kindness of Dr. Simanek, I was permitted to pass a duodenal tube before she was anesthetized. She was then brought to the operating room, anesthetized, and the usual gallbladder incision made. The gallbladder was exposed, and found to be fairly well distended, and before any exploration was made, fifty c. c. of a thirty-three and one third per cent. solution of magnesium sulphate was introduced directly into the duodenum through the duodenal tube. The suction bottles were applied in the usual manner, and in three minutes bile started to flow. In five minutes we started to get a real dark, golden bile (typical B bile) and the distended gallbladder gradually collapsed. I might compare this to the collapse of a balloon when the air is released (no contraction was observed). The gallbladder was then removed in the usual manner, and the bile in our collection bottle was apparently the same as that obtained from the removed gallbladder, only in greater dilution. I grant that this was done under anesthesia and hence open to some objection; however, I offer it for what it is worth."

I was naturally elated when I read this case report, and took it for granted that this observation of Sachs and Simanek was reliable, since it supplied a suggestion of positive proof which had not hitherto been furnished. I have recently seen Dr. Simanek, however, who told me that they have since then observed this occurrence on two other occasions. Now, how can we account for this apparent discrepancy inasmuch as these cases were also observed under general anesthesia? It seems probably that we can look for the logical explanation of this in some of the teachings of Pottenger (27) in his excellent book on Visceral Neuropathology (?), in which he broadens our well known clinical observations and shows that every individual is not possessed of the same degree of visceral neurological stability, that the necessary anesthetic dose which would obtund or abolish the visceral physiological reflexes in one individual might not do so in all. Therefore, in Sach's case it seems tenable to assume that the degree of anesthesia was not sufficient to completely abolish the crossed innervation to the gallbladder and papillary spinchter. Indeed this is further suggested in the fact that in Luckett's third, fourth, fifth and sixth cases one or more aspirations of duodenal contents following magnesium sulphate showed a delivery of a darker bile, as though the gallbladder were attempting to empty notwithstanding a partial obtunding of its neural pathways, although, as I have stated above, in none of his six cases was the recovered bile so dark as occurred after manually compressing the gallbladder.

At the conclusion of Crohn's demonstration of the second premise he states, "We are also led to believe from our observations that the gallbladder is a rather inactive organ which takes little part in the physiological production, storage, or expulsion of bile." In maintaining this contention they would have to contravert the conclusions of Rous and McMaster (*ibid*) derived from their very carefully observed and conducted studies. This applies likewise to Bassler, *et al.*, who also apparently ascribes a very small functional role to the gallbladder (?).

Therefore from what has been said above it must appear that the validity of Premise II concerning the nervous control of contractile tissues of the gallbladder and papilla has likewise been safely established.

Premise III.—Relaxation of smooth muscle of sphincter when magnesium salts are applied to duodenal mucosa and reflex contraction and emptying of the gallbladder.

These authors admit that the "observations of Meltzer on the physiological and pharmalogical action of magnesium salts are fundamental." They then proceed to mention some of Meltzer's experiments with magnesium sulphate, in which he could cause complete nerve blocking peripheral to the point of application; could prevent the occurrence of intestinal peristalsis with ergot and eserin when magnesium salts had previously been injected; the relief of the tonic spasms in tetanus following intraspinal injection of the magnesium salts; and noticed that when they were given by mouth to animals that its use then did not totally abolish the intestinal movements as when it was locally introduced, but merely depressed them. In addition to these observations, with which Crohn is familiar, it is a well-known fact that if a solution of magnesium sulphate is used as a diluent for a hypodermic injection of morphine sulphate it will prolong the analgesic effect of the morphine salt. I have no doubt that if magnesium sulphate was injected subcutaneously or intravenously that with a tube in the duodenum we would notice also an A, B, C sequence in bile flow.

(To be concluded.)

Blood in the Digestive Tract

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The presence of blood anywhere in the alimentary tract has a distinctly definite significance. It is evident that blood bespeaks the existence of a breach in continuity somewhere in the tissues associated with the digestive tract, provided that its exclusion from an exogenous source can be established. There is hardly a sign which in itself has so much weight in arriving at a conclusion regarding the existence of disease of the gastrointestinal tract as the presence of blood derived from the tract. The great obstacle attending the importance attached to the significance of this sign, however, is the question of ruling out hemorrhage from external or exogenous sources, such as the mouth and upper and lower respiratory tract, and also the possible occurrence of traumatic hemorrhage following the use of stomach tubes.

The purpose of this paper is to gain for the occult blood reaction a little more credit for the part it plays in the recognition of disease than it has received in the past. It is my opinion that the occult blood test is not used as often as it should be in the study of alimentary diseases, chiefly because the test is regarded as too fine and because a positive reaction due to trauma may lead one into error. These objections are no doubt in many instances correctly sustained, but it is my belief that material can most often be obtained from the alimentary tract under conditions that would warrant a ruling out of the presence of blood due to trauma or an exogenous source.

For the past few years, I have often heard members of the profession unhesitatingly condemn the entire subject of gastric analysis, simply because there was such great confliction in the understanding of the significance of the many findings that the stomach contents presented. It seemed that some authorities in recent years, upon the basis of certain studies, dared set forth new standards of normality which I feel were out of concordance with a proper understanding of the true conditions of a normal stomach and for that reason the subject of gastric analysis has suffered the slight setback or disfavor intimated above. I do believe, however, that the clear and excellent papers more recently published by Rehfuss and Hawk (1) will again tend to gain for this subject the attention it truly deserves. In these papers, the authors have reached conclusions which I believe are founded upon mature judgment.

The question of studying, by gastric analysis, gastric function, which comprises the activity of the stomach from the viewpoint of secretion, peristalsis, motility, and sensibility, is open to considerable deliberation or argumentation unless considered in conjunction with studies from other angles. This same pertinacity, however, does not hold in regard to inferences drawn from an examination of the gastric contents for indications pointing directly to organic disturbances, i. e., for elements such as blood and pus or pathological cellular material. The only difficulty attending this examination is the fact that these factors are not often so easily demonstrated microscopically to one's satisfaction and for that reason has this process of investigation often failed us in our endeavors toward a solution of these interesting problems. The chemical blood test is easily demonstrated and has not this objection against it.

It is plain that the presence of blood indicates bleeding somewhere and it is for us to determine as nearly as possible the exact point of bleeding and if possible also the reason for its existence. In conjunction with further study through other means, this becomes comparatively simple. It is very evident from what has just been said that only such diseases of the alimentary tract will be recognized through this study as will express themselves through the process of bleeding and, therefore, as a result study of this kind will in all likelihood eliminate diseases not characterized by a breach of tissue. Consequently, we may most often decide that in those instances where blood does not show in the gastric or duodenal contents or fecal excrement, the question of a destructive lesion affecting the mucous lining is remote.

First of all, before resorting to the use of the occult blood test in our studies of the material obtained from different portions of the alimentary tract, it is incumbent upon us to rule out the possible presence of blood through the medium of foods. To accomplish this, we must command our patients to abstain from all foods containing blood, such as meats, fish, etc., for a period of at least four days, so that we may feel reasonably sure that a blood reaction, if it does occur, is not due to the presence of food anywhere in the digestive tract. They must also abstain from a few other foods that are likely to give a false blood reaction, such as green vegetables, red wine, and various medicines. A simple diet consisting of cereal, such as oatmeal and cream of wheat; soft boiled eggs; white potatoes, baked or mashed; rice, macaroni, spaghetti, white beans, white asparagus, artichoke and the like; milk, buttermilk, tea and water; tapioca, rice custard, boiled or baked custard, etc., will suffice for a few days. We should also assure ourselves that the patient's bowels are practically rid of all excrementitious material resulting from food eaten previous to the institution of this meat free diet. After such preparation, we are permitted to look for the presence of blood in the alimentary tract and if found, we have a right to place some estimation of importance upon it, provided we can rule out the possible presence of blood resulting from trauma or contamination.

Traumatic bleeding is another conflicting element that we have to deal with from the viewpoint of blood reaction significance and it is my opinion that this element can be safely ruled out if the practice of resorting to the use of the smaller stomach tubes (Einhorn, Rehfuss, Lyon, Palefski, or Kanavel) is cultivated. The tubes with the larger openings are, however, preferable. A large experience will enable one to pass this tube with comparatively little distress to the patient and with very little danger of trauma. It is wise to force gently air through the tube before resorting to aspiration so as to balloon away from the metal tip any of the mucosal lining that is in immediate proximity to it. Through a wide experience, we cultivate an empirical sense that enables us judiciously to weigh the influence of trauma. As a rule, trauma will evidence itself through a small quantity of visible bright red blood which we seldom find in the stomach as a result of disease. If bright red blood occurs in larger quantity than a trauma would be expected to create then one must think of the possible causes that would either augment the quantity of bleeding a trauma might arouse or that are directly responsible for the nontraumatic bleeding present. An easily vulnerable mucosa, as is often found in achylia gastrica or passive congestion of the stomach, is subject to traumatic influence. Fairly large amounts of active bleeding may occur in cases of ulcer, erosions and growths. Further study from other angles will enable us to clear up the significance of this bleeding.

Thus far, we have excluded blood from the alimentary tract through the process of feeding and trauma, but there still remains the principle of contamination from such sources which if not ruled out would render our blood test worthless. I believe that, if we can eliminate swallowed blood as a factor, we have moved a step further toward the goal. There is no reason why this can not be done in most instances. The significance of our test depends upon it and it behooves us to look into the condition of the nose, throat and lungs before we make our final decisions. In the study of the fecal excrement, we must rule out rectal or anal bleeding and menstrual contamination.

It is my opinion that no one single test has greater importance in the study of diseases of the alimentary tract than that of the blood test, visible or occult, but all of the factors in the preceding paragraphs must be borne in mind lest the importance of the test dwindles into obscurity. Therefore, it should be our duty to adhere routinely to this method of study in every instance that alimentary cases present themselves for examination. As a result of the examination of thousands of specimens of material from the gastric and duodenal cavities, as well as fecal excrement for occult blood, I have become strongly disposed to look upon this test with favor.

Blood, not swallowed or not due to trauma, when found in the stomach may result from many causes, such as ulcer, cancer or passive gastric congestion, erosions of the stomach or similar lesions above in the oesophagus, occasionally a ruptured varix in these organs, and at times bleeding regurgitated back from the duodenum. When seeking blood in the gastric cavity, it would seem most logical to look for it in the fasting stomach, for if there is any bleeding going on in the stomach, it will have accumulated in this organ in concentrated form and corroborative microscopic studies may be attempted. Of course, if the bleeding in the stomach is of active type, it will also show as a rule in the contents following a test breakfast. I have, however, often found blood in the fasting contents due to a gastric lesion which did not show a distinct blood reaction after a test breakfast examination. About the only way to account for this apparent inconsistency is upon the assumption that the bleeding is not a very active one and that as a result sufficient blood to give a distinct blood reaction has not had time enough to accumulate during the course of the test breakfast digestion. I believe that there are many instances when minute bleeding occurs, due probably to small erosions, papillomatous growths and healing ulcers or fissures, and in these cases not enough blood is at times allowed to accumulate in the stomach to give a blood reaction, while a small portion also probably is carried into the bowel. In this way the very small amount of hemorrhage is disposed of without being detected. In other instances, as mentioned above, the small quantity of blood shows only in the fasting stomach and nowhere else. At any rate, it is possible that a breach in the continuity of tissue can exist for a while without bleeding or with very little. Therefore, I believe that we have a right to assume that in those cases where the gastric contents give a negative blood reaction we are reasonably safe in ruling out an active open breach in the continuity of tissue, although a broken nonbleeding or healing tissue must be borne in mind. Another point to be stressed is that we must appreciate the fact that all work of this character has its greatest value when considered in conjunction with study from every other available angle.

To obtain blood from the duodenum after having previously satisfied our minds that it does not come from above this area, would also bespeak a breach in the continuity of tissue in either the duodenum or some other tract associated with it, such as the liver, gallbladder, bile ducts, pancreas, or pancreatic ducts. Of course, the possibility of a rupture of a neighboring diseased process into the duodenum must not be forgotten.

Blood is usually found in the stool in those instances where fairly active bleeding takes place anywhere above. When this bleeding is of macroscopic type and bright red, the source is generally low down, as in the sigmoid or rectum. When the bleeding is visible to the eye in the form of altered blood (dark tarry stool), the origin is usually higher up, either in the stomach, small intestine, or upper portion of the large bowel. When it occurs in the stool only in occult form, the bleeding is in all probability not so great in quantity and generally from a point higher up. In every instance where occult blood is found in the excrement, an examination of the sigmoid and rectum should be made so as to eliminate bleeding from these areas. If investigation of the stomach and duodenum does not reveal the presence of blood, and if the sigmoidoscopic examination does not reveal probable bleeding points, then the source of the blood in the stool must be ascribed to a point somewhere in the remaining portions of the small and large intestines. Of course, x ray study will further enlighten us in this direction. When, however, the stool gives no evidence of the presence of blood, we should not be too hasty in jumping to the conclusion that no blood in the stool implies no bleeding anywhere in the alimentary tract. That is not so, for I have had many instances of disease of the stomach and duodenum where minute but active bleeding demonstrated itself in either the stomach or duodenum fluids yet the stool in these cases gave a repeated negative blood reaction. It may be that the blood was not distributed homogeneously throughout the excrement, or it may be that it was altered or absorbed lower down in the intestine as a result of which no occult blood reaction was obtained.

CONCLUSIONS.

In conclusion, I wish to state that the following facts should be borne in mind by those engaged in the study and treatment of alimentary disturbances:

1. That bleeding anywhere in the body implies a breach in the continuity of tissue, and since many gastrointestinal affections are characterized by a breach in tissue, it should be our duty to look for blood in the alimentary tract.
2. A great deal of practice in the use of the smaller tubes will reduce the probability of trauma to a minimum and a wider experience with the blood test will enable the worker to place a proper estimation upon it.
3. That bleeding from the respiratory tract, teeth, gums, etc., or from hemorrhoids, rectal growths or anal fissures, may as a rule be accounted for, and that such bleeding can often be ruled out.
4. That those conditions which do not give evidence of the presence of blood in either the gastric contents, duodenal contents, or stool are generally functional in origin or nature; that the absence of blood in the stool alone does not exclude the possibility of small hemorrhage above as in the stomach and duodenum.
5. That very small amounts of blood may accumulate in the fasting stomach as a result of a breach in the gastric lining, yet will not accumulate in the short hour following the administration of a test breakfast, hence no positive blood reaction will be obtained in the test breakfast contents.
6. That when bleeding can be ascribed to certain portions of the tract, the fact of the existence of organic disease is established, and that such a breach in continuity may indicate ulcer, erosions, papillomatous growths, chronic inflammation, passive congestion, or malignancy in the mucosa, corresponding either to the area of the stomach or bowel from which it has been obtained, or to a point in adjacent organs connected with the bowel tract, such as the liver, pancreas, gall ducts or gallbladder.
7. That to know that bleeding exists is in itself a most worthy accomplishment and that to ascertain the direct cause of the bleeding should require study from every other angle and through every possible means at our command.

REFERENCES.

1. Rehfuss and Hawk: Gastric Analysis, *Journal A. M. A.*, February 5, 1921.
2. *Idem: Ibid*, February 26, 1921.

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Local Anesthesia in Dental, Oral, Nose, and Throat Surgery

With Particular Reference to Nerve Blocking

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INJECTION AT THE ANTERIOR PALATINE FORAMEN.

Synonyms.—Anterior palatine, anterior palatine foramen, incisor foramen, nasopalatine foramen, nasopalatine, incisor canal, and nasopalatine canal.

Object.—To reach the foramen and anesthetize the nasopalatine nerves in their passage through it.

Location.—The anterior palatine foramen is situated on the hard palate about quarter of an inch behind and above the space between the two central incisor teeth. Its oral opening is closed by the incisor papilla.

Preparation.—Since this injection usually follows one made at the infraorbital foramen, the excess solution from that is used, or a fresh solution is prepared according to the same method. Select a sterile needle twenty-five mm. long of twenty-three gauge, and equipped with a hub to fit the syringe used. The syringe best adapted to this injection is either a two c. c. Fischer, or a two c. c. Luer. Fill syringe, invert it so its point is upward, expel air bubbles, attach needle and again expel air bubbles. Cleanse area and paint site of insertion of needle with the iodine mixture.

Specific technic.—It would seem that entrance to the anterior palatine foramen could be gained by passing the needle directly through the incisor papilla. That is true, yet the papilla is so extremely sensitive to pain that it seems more humane to make the entrance from one side. Insert the needle into the palatine tissue at a point about six mm. behind the middle of the central incisor tooth, that is, to one side of the papilla. Point the needle upward and inward toward the median line, at an approximate angle of forty-five degrees when viewed from the front, but in a vertical line when seen from the side. Advance the needle slowly, forcing a drop of solution ahead of the needle. Continue the advance of the needle until it enters the foramen and strikes the opposite bony wall of the foramen. Here inject half a mil of one and a half procaine solution. Take at least half a minute to inject the quantity mentioned. Withdraw the needle and see that it is in its proper place on the hub. Anesthesia will be present in five minutes or less.

Test for anesthesia.—The presence of anesthesia is indicated by absence of pain upon pricking the mucous membrane near the first bicuspid tooth on either side of the hard palate.

Accidents.—The needle may break. The patient may get extremely nervous, on account of the painful entrance of the needle, and soreness, sloughing, fainting, shock or collapse will follow the use of old, discolored, unclean or nonisotonic solutions, and infection and dangerous abscesses will follow the use of unclean instruments.

Nerve complications.—None in this injection.

Remarks.—The resulting anesthesia extends back to the first bicuspid, sometimes the second bicuspid; on each side and in the bone underlying the palatine mucous membrane. Anesthesia is observed by the blanching of the tissue during the injection, which is due to the action of the suprarenal extract. By the technic in use heretofore it seems to have been possible to anesthetize one side of the median line only, whereas with the technic given it is possible to anesthetize both sides.

INJECTION INTO THE POSTERIOR INFRAORBITAL REGION.

Synonyms.—Posterior infraorbital, posterior infraorbital canal, second division, superior maxillary division, sphenomaxillary, high posterior zygomatic, and high tuberosity.

Object.—To reach the sphenomaxillary fissure, just internal to the posterior end of the infraorbital canal, and there anesthetize the superior maxillary division of the trifacial nerve and its distribution anterior to the point anesthetized.

Location.—The sphenomaxillary fissure lies posterior to the junction of the posterior end of the floor of the orbit and the superior edge of the posterior surface of the maxillary bone.

Preparation.—Prepare four mils of one and a half per cent. procaine solution, this quantity includes an excess of one and a half mils; to the solution prepared add one drop of suprarenal extract, which gives an equivalent of about one to 60,000. The amount of solution prepared is for use on one side only. A special needle is required for this injection. The needle proper is of iridioplatinum, forty-two mm. long, of twenty-one gauge, and, of course, the hub at the end of the shank must fit the syringe used. The shank of the needle is gold plated and is approximately sixty-seven mm. long over all. Ten mm. of its length is turned up at an angle of about one hundred degrees. The syringe best adapted to this injection is either a three or four c. c. Luer or a three or four c. c. Record. Fill springe with solution, invert so its point is upward, expel air bubbles, attach needle, and again expel air bubbles.

Specific technic.—Palpate the posterior border of the zygoma to learn of its curvature. With the index finger hold the cheek away from the molar teeth so the view will be unobstructed. It is well to have the patient's mouth partly closed so there will be no strain on the muscles. Paint the area of the mucous fold above the last two molar teeth with the iodine mixture.

Insert the needle point into the highest point of the mucous fold above the posterior root of the second molar but about twelve mm. external to the gum. Because of the peculiar shape and the length of the needle, its entrance must be made nearly parallel to the occlusal plane, yet the angle at which it is entered should be as great as the partly closed mouth will permit. After the needle point has entered the tissue, it should be directed upward and inward toward the median line, endeavoring to carry it upward at an angle of about forty-five degrees when viewed from the front but, if it could be seen from the side, it should be nearly vertical.

Advance the needle upward in the direction given. After about fifteen mm. of the needle has entered the tissue, the side of its point should touch bone. Continue to advance the needle upward in the direction given, keeping its point in contact with bone. Do not get the needle point under periosteum, it will be impossible to direct the needle if that should happen. The needle should be advanced until from twenty-five to thirty mm. of its length shall have entered tissue, or until from seventeen to twelve mm. of it shall be exposed. An insertion of thirty mm. applies to the adult head of average size. If the subject has a smaller head or if it is a child, the distance of insertion should be relatively shorter. Measurements of forty-three heads and sixty-four skulls show a maximum distance of thirty-five mm., a minimum of twenty mm. with an average of twenty-seven mm.

A reasonably safe and sure method of arriving at the approximately correct distance for the insertion of the needle in an individual head is as follows: Palpate and locate the infraorbital foramen on the face. With a soft pencil mark the centre of the foramen on the skin. Raise the upper lip out of the way. With dividers measure the distance from the centre of the foramen, as marked, to the highest point of the gum margin of the nearest bicuspid tooth. From the distance obtained, deduct three or four mm. Now mark off on the needle the remaining distance, measuring from the point backward. A piece of unvulcanized rubber may be slipped onto the needle to mark the distance of needle insertion.

As a concrete example; let the distance from the centre of the foramen, as marked on the face, to the highest point of the gum margin of the nearest bicuspid tooth be thirty mm. Deduct from this three mm., and we have an opening between the points of the dividers of twenty-seven mm.. Slip a piece of rubber onto the needle. Measure with the dividers the twenty-seven mm. from the point of the needle. Move the piece of rubber to the measured length. There let the rubber remain to serve as a guide to the depth of insertion of the needle.

Remember, while advancing the needle to its proper position, to endeavor to keep the side of its point in contact with the periosteum of the posterior surface of the bone but not under periosteum. Do not bend the needle in attempting to do this. If contact with bone is lost, withdraw the needle and start again. The tissue through which the needle passes on its way to the desired point is devoid of any important structures except the posterior superior dental nerve. If the line is followed, as suggested, this nerve will be from five to eight mm. internal to the needle. The internal maxillary artery will be from eight to ten mm. posterior to the needle; in fact, it is principally fatty areolar or connective tissue through which the needle passes.

Actually, this is one of the safest and most satisfying injections possible in the field of local anesthesia in spite of its seeming difficulties, provided the technic is followed.

When the needle arrives at the point specified, its point is within five mm. of the superior maxillary division of the fifth nerve and about the same distance from the sphenopalatine ganglion. At this point inject two to three mils of one and a half per cent. procaine solution. Do this slowly. Take two to three minutes to inject the quantity given. The syringe may be kept moving during the injection, if desired, but this is not absolutely necessary if the injection is made slowly. Withdraw the needle from the tissue. Look to see that it is in its proper place on its hub. Wait fifteen to twenty minutes for anesthesia to appear.

Test for anesthesia.—The presence of anesthesia may be determined by pricking the mucous membrane above the teeth from the molar teeth forward, on both the labial and the palatine surfaces. The extent of anesthesia is thus discovered.

Nerve complications.—The long buccal nerve may be involved in the buccal mucous membrane. The anastomosis from the opposite side will involve the alveolar, dental and palatine area near the median line. In the nose, the anterior part of the nasal cavity, both on the septum and on the lateral walls, overlapping branches of the nasal branch of the anterior ethmoidal nerve will interfere with the work in hand. This may be blocked by Killian's punctures, by injection at the anterior ethmoidal foramen or by a pack of twenty per cent. procaine solution with one in 60,000 suprarenal extract.

Accidents.—The needle may break, as a result of bending or careless handling. It may enter and puncture one or more veins of the pterygoid plexus, resulting in the prompt appearance of a hematoma after removing the needle. Soreness, fainting, shock or collapse will follow the use of old, discolored, unclean or nonisotonic solution, and infection and dangerous abscesses will follow the use of unclean instruments. A slight and passing disturbance of the eye functions may follow an injection which is made too high in this area or one that is made too fast. None of these things can happen, however, if the technic is followed.

Remarks.—The resulting anesthesia from this injection covers a considerable area. It should comprise the entire nasal cavity except that portion supplied by the nasal branch of the anterior ethmoidal nerve, the teeth, the hard and soft palate, the pillars and part of the tonsil, the upper lip, the lower eyelid, the skin of the face between the two parts last mentioned, part of the skin of the nose, and the maxillary sinus. Frequently, when the injection has been made improperly, the parts supplied by the anterior superior dental and the infraorbital are not anesthetized. An injection at the infraorbital foramen, in this case, will anesthetize this area.

ANESTHESIA BY INFILTRATION (DENTAL).

Synonyms.—Infiltration, submucous, and subperiosteal.

Object.—To introduce the needle into the buccal, labial, lingual or palatal membranes and thus anesthetize the area injected. The action is produced by infiltration of the solution through the foramina into the cancellous bone structure within the alveolus and by diffusion of the solution in the soft part injected. This method of producing anesthesia is not satisfactorily applicable to the lower teeth posterior to the cuspids, and frequently it is not satisfactory in the area of the upper first and second molars. This is due to the density of the outer plate of the alveolus in both cases.

Preparation.—Prepare three mils of one and a half per cent. procaine solution to which add one drop of suprarenal extract. Select a sterile needle twenty-five mm. long, of twenty-three gauge and equipped with a hub to fit the syringe used. The syringe best adapted to this injection is either a two c. c. Fischer or a two c. c. Imperial type. Great pressure is frequently necessary to make this injection. Fill the syringe with solution, invert so its point is upward, expel air bubbles, attach needle, and again expel air bubbles. Cleanse site and areas for injection, and paint with iodine mixture.

Specific technic.—For a single tooth in the upper jaw, back to and including the second bicuspid, insert the needle into the gum tissue at a point about six mm. above the gum margin of the tooth selected. The syringe should be held so that it is at right angles to the gum tissue, that is, it should point directly at the mucous membrane. The bevel of the needle should be directed downward. Enter the needle into the tissue until its point touches bone and is under periosteum. Swing the body of the syringe downward, using the needle point as the centre of the swing, so when the swing shall have been completed, the needle points upward, parallel with the long axis of the tooth and root. Now, advance the needle upward, keeping its point under the periosteum, if possible, until its point shall have arrived opposite the apex of the tooth root.

During the advance of the needle a small amount of solution should be ejected, just enough to make the advance of the needle painless. When the needle point shall have arrived opposite the apex of the root, inject slowly from a half to one mil of solution. Take from a half to one minute to make the injection. Endeavor to inject the solution under the periosteum. Considerable pressure may be required to make this injection. Withdraw the needle and see that the needle is in its proper place on its hub. Massage the gum lightly but firmly.

In connection with this labial or buccal injection a palatine injection must also be made.

Palatine infiltration.—Insert the needle into the palatine tissue at a point opposite the middle of the tooth desired but about four mm. above the gum margin. Advance the needle to a depth of about eight mm. and inject slowly, four or five drops of solution. Withdraw the needle and see that it is in its proper place on its hub. Massage the area lightly but firmly. Wait three minutes for anesthesia to appear.

For anesthesia of the three anterior upper teeth and two or three teeth posterior to the cuspid, insert the needle into the gum tissue six to eight mm. above the gum margin of the cuspid tooth and on the crest or eminence of that tooth. The syringe should be held at right angles to the mucous membrane, pointing directly at the gum tissue. The bevel of the needle should be directed downward. Advance the needle to periosteum and bone. Now, swing the syringe toward the front or toward the median line so that when the needle is advanced it will pass along the alveolar process in a posterior direction on a level with the apices of the bicuspid teeth. Advance the needle in this posterior direction, endeavoring to keep its point under periosteum. Eject a small amount of solution during the advance of the needle to render its progress painless. Over the apex of each tooth encountered, deposit four or five drops of solution, then advance the needle to the next root apex. Continue this procedure as far posteriorly as desired.

Withdraw the needle until its point reaches the original site of insertion but do not remove the needle completely out of the tissue. Now, swing the syringe in nearly a half circle, keeping the needle point under the tissue. The swing of the syringe should be sufficient to enable the operator to advance the needle along the labial aspect of the alveolar process, toward the median line, under the periosteum, if possible, and opposite the apices of the central and lateral teeth. Over the apex of each of these teeth deposit four or five drops of solution. Again withdraw the needle to the point of its insertion and swing the syringe so that the needle may be directed upward along the crest of the cuspid tooth. Advance about six mm. and deposit four or five drops of solution. Now withdraw the needle completely from the tissue and see that it is in its proper place on the hub. Massage the gum lightly but firmly. Wait three minutes for anesthesia to appear.

Inject the palatine area as described above or by the method described for injection at the anterior and posterior palatine foramina.

For the six anterior upper teeth, follow the procedure described above, except that the needle should be inserted into the tissue at or near the median line. Four or five drops of solution should be deposited over the apex of each tooth. On the palatine surface make the injection at the anterior palatine foramen.

For the six anterior lower teeth, use the technic described for injection at the incisive fossa.

For the upper molar teeth, enter the needle into the gum tissue six to eight mm. above the gum margin, in the region of the second bicuspid tooth. The needle should be directed posteriorly and should travel under the periosteum on a level with the apices of the molar teeth. Deposit five or six drops of solution over the apex of each tooth desired. This injection is not always successful on account of the density of the bone. It is better practice to use the method described for injection at the tuberosity. In connection with the molar infiltration injection or the injection at the tuberosity, an injection must be made at the posterior palatine foramen. Infiltration injections made posterior to the lower cuspid teeth are seldom successful.

TO ANESTHETIZE THE LONG BUCCAL NERVE.

After anesthesia has been obtained in the lower jaw by a mandibular injection, or in the upper jaw by an injection at the tuberosity or into the posterior infraorbital area, sensation frequently remains in that portion of the cheek and mucous membrane described by the distribution of the buccinator muscle. This muscle is ennervated by the long buccal nerve, a branch of the mandibular division of the trifacial. Since pain at any stage of an operation leaves an unpleasant memory, this nerve must be anesthetized. This may be accomplished by one of two methods, the infiltration method or the conductive method, both of which are described below.

By infiltration.—Employ the needle and syringe used for the major injection. Observe the usual precautions and care. Insert the needle into the mucous membrane of the cheek at a point six to eight mm. above or below the mucous fold, about ten mm. posterior to the corner of the mouth, or opposite the second bicuspid tooth. Point the needle directly backward, carrying it just under the surface of the mucous membrane. Eject some solution in advance of the needle to make its progress painless. Advance the needle until its point is beyond the last tooth involved in the operation. Begin to withdraw the needle, depositing about half a mil of solution as the needle is withdrawn. Endeavor to deposit the solution so that it is evenly distributed along the line of injection.

By blocking the main trunk.—Locate the trunk of the long buccal nerve by inserting the finger between the cheek and the teeth and drawing outward on the cheek. At the posterior part of the cheek a ridge-like line will usually be seen to stand out on the mucous membrane. This line is the long buccal nerve. About midway of the line, enter the needle into or under the mucous membrane. Advance the needle along the line for about ten mm. If the advance of the needle is painful, eject enough solution to make its progress painless. Deposit along the line of the injection about half a mil of solution.

Area anesthetized.—The infiltration injection blocks sensation in the gingival area of the mucous membrane above or below the line of injection. The injection along the main trunk anesthetizes the entire distribution of the nerve distal to the injection.

Race Immunization

By CASPER L. REDFIELD,
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In the past lawyers were used to get people out of legal troubles after they had got in; now they are largely used for keeping people out of trouble.

In the past physicians were employed to help people escape death or disease after they had got an untimely start in that direction; now they are sometimes employed to prevent disease being fastened upon us. Let us hope that in the future they will be employed more and more in helping us to avoid disease and less and less in trying to cure us after we have fallen victims to some deadly germ.

There are two ways of avoiding illness due to attacks by pathological germs. One way is to run away and hide, and the other is to meet the germs and defeat them in a stand up fight. Under the run away and hide method I would include all quarantines, boil the water processes, and escapes by escaping. By the stand up and fight method I mean applying personal resistance to disease, such as that which is obtained by vaccination against smallpox and typhoid, and which is called immunity when it is inherited.

In a state of nature, those animals which escape danger by hiding are those which become degenerate, and unless we also wish to become degenerate, hiding is not a good method to pursue as a regular thing. Also, as the population increases, hiding becomes more and more unsafe. We may hide for a time, but sooner or later we must meet those pathological germs which are widely distributed, and the outcome will depend upon our ability to conquer them.

When a person is vaccinated against smallpox he acquires a resistance which is specific for that disease, and which lasts for several years but gradually dies out. When he is vaccinated for typhoid he acquires a resistance specific to typhoid, and when he is vaccinated against other diseases he acquires resistances which are specific for those particular diseases. In each case the resistance acquired gradually subsides, and the man again becomes susceptible to diseases against which he was before immune.

What is wanted is a means of making the race practically immune to practically all germ diseases, or so highly resistant that germ disease will be serious only in rare cases. We cannot vaccinate each person against all different germs of a pathological character, largely because we do not know them all, and it would be an intolerable proceeding if we did. We must, therefore, look for some means of building up resistance to diseases in general as distinguished from diseases in particular. To do this we must go back to fundamental principles and consider what is the nature of resistance to disease.

When a person is active he expends certain foot pounds of energy, and foot pounds are something well known to science. If a person is extremely active for a long time without rest he becomes exhausted, and a person so worn down is much more likely to be attacked by pathological germs than when not exhausted. This is a fact which shows that the energy we know in science and measure in foot pounds is fundamentally the thing which resists disease. It is also known that by continual overexertion a man may cause his own death by reason of nothing else than the expenditure of the foot pounds which were in him before the exertions began. This is a fact which shows that life itself is simply a form of the common energy known to science. And when a body is dead it is quickly destroyed by bacteria which are unable to harm it when it is alive. This is further evidence that the energy within an organism is what resists the attacks by other organisms.

But there is such a thing as energetic physical exercise which is less than that which is exhausting and which brings on attacks by bacteria. This less activity expends foot pounds more slowly and is one step in the process of increasing the store of energy in the system. A still greater decrease of activity results in a gradual decline in the powers previously existing. To put the matter in a different form, there are two critical points in the taking of exercise. Any amount of physical effort to the unit of time which is less than the lower of these points is designated as idleness and results in a natural decline in powers. Any amount of effort which is greater than the upper of these points is an overload which causes exhaustion, invites bacterial attacks, and results in death if not arrested. Any amount of effort between these two points is properly termed exercise and develops the powers exercised.

When a person exercises by swinging dumbbells, the muscles of his arms get tired and after a time he must stop to rest. After he has rested for a few minutes he can resume the swinging of dumbbells, but soon must rest a second time. By alternate short periods of exercise and rest he may continue his dumbbell swinging operations for a considerable length of time, but sooner or later he must take a longer rest. While he is thus exercising he is expending the foot pounds of energy which were stored in the muscles in and adjacent to his arms. During each short period of rest, the energy expended by the exercised muscles is partially replenished by other energy drawn from other bodily organs. The evidence of such replenishment from other organs is found in the fact that a man who has become tired by swinging dumbbells is in no condition to run a foot race or compete in a debating contest. His leg power and his brain power have been expended through his arms.

The points to be made by the foregoing examples are that the power which fights disease of any kind is common mechanical energy; that the quantity of energy in any organs may be increased by properly exercising them; that the supply of energy in one organ may be drawn upon to help out another organ which is subjected to an unusual load—an overload; and that such transference of energy from one organ to another may also involve a transformation as when mental energy is drawn upon to help out tired arm muscles. As bacterial attacks are local, this power of transforming energy and transferring it from unaffected places to the points of attack is important in both prophylaxis and therapeutics.

Another point to be noted here is that the development of powers by exercising them is not a thing which is strictly limited as supposed by many persons, but continues indefinitely as long as a considerable degree of exercise continues. When the trotting horse is continually trained he continues to gain in trotting power up to seventeen years of age as shown by race records, and up to some point beyond twenty as shown by other records. Cows regularly bred and regularly milked continue to increase in milk producing power up to at least twelve years of age. The same thing in regard to other powers is shown in other animals, in plants, in bacteria and in protozoa. In fact, the development of powers by exercising them is a characteristic of protoplasm.

A comparatively few different kinds of germs seem to be responsible for a large variety of different diseases. This means that the same germ will cause different diseases according to what part of the body it attacks. On the other hand, different strains of the same germ sometimes cause diseases which are similar but not identical, as in case of pneumococci.

But what is perhaps the most important point is that about half a dozen different germs are complicating factors in a great variety of diseases. If a person is immune, or highly resistant, to complications arising from attacks by these few germs, he has to fight only the primary invaders, and that is much easier and simpler than fighting a whole menagerie at the same time. The most important of these secondary invaders seem to be streptococci, staphylococci, and pneumococci, of each of which there are known two or more varieties.

Let us begin our experiments on John Smith by giving him typhoid inoculations at intervals of a few days. In this case we do not follow the ordinary prophylactic treatment and finish the job in three doses. We begin with a dose somewhat smaller than the regulation first dose and gradually increase the size of the dose until we reach the maximum at the eighth or tenth. Investigations in other directions show that to get a lasting quality to powers built up by exercising them, time and continued repetition are essential elements.

Another thing to do in this proceeding is to shift the point of vaccination from place to place on the body and not always vaccinate at the same place. In fighting living germs, or their toxins, the cells of the body have to do the work, and man is made up of large numbers of cells distributed in many different organs. Diseases are local, and remote parts of the body do not ordinarily help fight an overload unless the strain is excessive. By causing immune reactions to vaccination to occur at different parts of the body, the immunity becomes general, and consequently it is simpler and easier for remote organs to lend their powers to those attacked.

Having finished with the typhoid series we go through a similar series of inoculations for streptococci, another series for pneumococci, and so on for three or four others. Having finished these we shift back to typhoid, or typhoid mixed with some thing else, and then go through a series of inoculations involving combined vaccines. In this repeating process we use nearly the previous maximum doses and shift from one vaccine to another after one or two inoculations. The object of this is not only to increase the specific powers of resisting specific germs, but to develop the powers of shifting from one kind of action to another. In other words, to make an all around athlete out of the defensive system.

While these inoculations are going on, Smith should take a mild course of physical training to build up his general powers without at the same time becoming sufficiently exhausted to make him susceptible to bacterial attacks. After this process of physical exercise plus vaccination has been continued for six months or a year, an inoculation with some mixed vaccines once a month or once in three months, combined with continued physical exercise, should keep a person practically immune for an indefinite period. In this connection it should be remembered that a reasonable amount of physical exercise is an absolute necessity to continued health.

Would it be necessary to repeat this operation for each individual, generation after generation? Not exactly. It has been demonstrated that powers developed by exercising them are inherited. Consequently, if parents are made immune by this or any other process before their children are conceived, those children will inherit a high degree of resistance to the diseases involved. That such inheritance exists for trotting power, milk producing power, intelligence and several other powers I have shown in other contributions. Here we will consider a few items relating to diseases.

A person becomes immune to smallpox either by having the disease or by being vaccinated. There is a history of smallpox extending over about nine hundred years, during the last one hundred of which we have had vaccination. During the other eight hundred years, smallpox came in waves separated from each other by a period of time equal to about a generation. When a wave receded, those who were left alive were immune, but by the time the next wave came, that immunity had died down because the powers involved were not being exercised during the intervening years. The result was that the socalled selective death rate made no improvement at all. During the eighteenth century, smallpox was worse than ever before.

After the beginning of the nineteenth century, vaccination became general, and the result was that the incidence of smallpox became less common, and the virulence of the disease much less, even among the unvaccinated descendants of vaccinated progenitors. Here we have a direct case of the inheritance of resistance developed by vaccination.

Tuberculosis is one of those diseases which hangs on for a long time, and a person who contracts it has ample opportunity to develop his powers of fighting it. Autopsies show that about ninety per cent. of all persons who die from other causes, have, at some time in life, contracted the disease and recovered from it. Evidently, the older a person is, the more likely it is that he has fought the disease and has developed his powers of resisting it. With that in mind, observe the following data in regard to 381 tuberclous patients at the Crossley Sanatorium at Frodsham, England.

TUBERCULOSIS BY BIRTH ORDER.

Child	*Normal Number*	*Observed Number*	*Percentage Tuberculous*
First	67.0	113	168.64
Second	64.4	79	122.70
Third and fourth	109.4	93	85.01
Fifth to seventh	98.3	75	76.30
Eighth and later	41.9	21	50.20
	381.0	381	

This table means that of 381 persons in the community involved, normally sixty-seven would be first children, sixty-four would be second children, and so on. The table shows, however, that the tuberculous patients were not distributed that way, but that earlier children suffer much more from tuberculosis than do later children. Stated in another form, the table shows that the greater the extent to which parents have exercised their powers of fighting tuberculosis before their children are conceived, the greater is the resistance of the children to that disease.

Syphilis is another lingering disease against which a person develops resistance by fighting it. It is well known that the earlier children of syphilitic parents suffer more from this disease than do later ones. A common history of syphilitic families is two or three abortions, followed by one or more weakly children, and then the production of healthy offspring. Clearly, the children inherit the resistance which the parents develop by fighting this disease.

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Twins and the Problem of Heredity

By MAXIMILIAN P. E. GROSZMANN,

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Some time ago the American Genetic Association began to accumulate a collection of photographs of twins. After a considerable number of twins had thus been discovered, a questionnaire was sent out to obtain information on resemblances and differences between the members of twin pairs. Six hundred twins and parents of twins wrote letters from all parts of the world, and about one hundred and seventy-five photographs were received. An entire issue of the *Journal of Heredity* was devoted to a discussion of the results of this minute study. It contains many reproductions of the most instructive photographs in the collection. As this study throws much light on the much mooted question of the relative importance of heredity and environment, I will reproduce some of the results and discussions, partly quoting from the articles themselves, adding such comment as may seem pertinent.

Generally speaking, the geneticists have accepted the findings about twins as fully corroborating their theory of the paramount importance of heredity and the nontransmission of acquired characters. Says

Dr. David Fairchild, president of the American Genetic Association, in an opening treatise:

> "It is strange to think of the way our inheritance comes to us, to realize that all we are to inherit from our mother and from her entire family is contained in a single tiny cell, while all we are to inherit from our father and his family is contained in another tiny cell. When these two cells meet they become one larger cell and form the beginning of a new individual."

This view limits heredity to the cell plasm, and omits those congenital factors which may affect the growing embryo during intrauterine life. Dr. Fairchild continues:

> "It is wonderful and almost passing belief to realize that a single microscopic cell holds so much of our destiny within itself and that it contains the mechanism which will determine the color of our eyes, the shape of our nose, the love of music, the taste for literature, for law or for science, the quickness of temper or sullenness of disposition which will go so far in deciding what our future is to be. All that the generations of ancestors behind us can give us of themselves, they give us through this tiny cell.
>
> "This cell grows and divides into two cells; each of these grows and divides into two more cells, and so the process goes on, controlled by the mechanism contained in that original cell—that mechanism, the so called chromosomes which are easily visible through the microscope."

It is indeed these chromosomes, their number, shape, and arrangement in the germ cells, which according to this view contain all there is of heredity. Dr. Frederick Adams Woods, in the same issue of the *Journal of Heredity*, maintains this:

> "The word heredity should be understood to signify all that is contained in the original fertilized cell (zygote) from which all subsequent cells are, by cell division, produced. If the chromosomes are found to be the sole intracellular agencies controlling the normal development of the body, then the word heredity may be considered synonymous with chromosomes, and to say that a man has a good heredity is to say he has good chromosomes. If, as is more probable, other portions of the cell enter somewhat into the matter, though to a limited extent, then the word heredity is almost, though not quite, an equivalent of the word chromosomes."

The discrepancies in the opinions of geneticists here noted have little bearing upon the mechanistic theory of heredity as presented by Dr. Fairchild and others. Whether or not the cytoplasm is a factor of determination in addition to the chromosomes does not alter the general conception of the mechanism.

However, if we accept the statement that each father and mother cell contains all there is to be inherited from the paternal and the maternal side, it is not quite clear why one germ cell of a father, or one germ cell of a mother, should differ from another germ cell in the same set. Yet Dr. Fairchild states that "no two mother cells are alike, nor any two father cells; each contains a different arrangement of the hereditary characteristics." He apparently refers to those chance variations which play such a rôle in these theories. Dr. Danforth, in a statement quoted later, amplifies this view. That some variations may be due to changed conditions in the parents during the course of their lives, is not considered. As Dr. Fairchild puts it:

> "Every individual produced by the union of a father and a mother cell is different from one produced by any other union. Although they are brothers and sisters, with the same hereditary characteristics behind them to draw from, they have inherited these characterists in such varying arrangement that they may vary as much as did the hundreds of people who were their ancestors on either side of the family.
>
> "Now it sometimes happens—we do not know why—that this original cell, made from two parents' cells, in one of its earliest divisions splits entirely in two, and the two halves, instead of remaining together as they usually do, remain separate and grow into separate individuals. In this case the two new individuals will have exactly the same heredity and they are the only human beings we know of who have: and it is such individuals whom we speak of as identical twins. They are always of the same sex and always resemble each other to an extraordinary degree throughout the whole of their lives. Fraternal twins, who do not resemble one another and who may not even be of the same sex, are the product of the unions of two different mother and father cells, and have simply happened to be born at the same time."

It is not quite clear why it is assumed that in the splitting up of one fertilized cell (zygote) into two complete halves, thus producing identical twins, there should always be a clear and identical division of the chromosomes concerned.

> "There are cases where two of triplets appear to be identical twins and the third to have originated from a separate cell. Cases of identical quadruplets are theoretically possible by assuming that the fertilized cell splits into four quarters. If one of these failed to grow, identical triplets would result.
>
> "We have, then, in these identical twins, cases of human beings who start out, not as two different mixtures of the free and variable cells of their parents, but as halves, so to speak, of one mixture. . . ."

And now comes a concession which bears out what I have said before, namely that it is not a safe assumption to assert that identical twins are the result of two identical halves:

> "A close study of these photographs will reveal that no two of the most similar twins are absolutely alike. Perhaps there is some slight difference in the lobe of the ear or the direction of the hair on the forehead. Supposing there was as slight a difference in the lobes or convolutions of the brain, who knows what changes in intellect this might bring with it?"

It is seen that this conception postulates a purely somatic basis for all intellectual and moral conduct. In this sense, modern genetic theories revive the materialistic philosophy of half a century ago, unless we accept the theory of monism that force is the underlying principle, and matter but the form in which force manifests itself.

But the most sweeping conclusion is the one referring to the relative importance of hereditary and environmental factors. Says Dr. Fairchild:

> "It may not appeal to some as important that we learn which of our characteristics are hereditary and which are environmental, but to those who have given serious attention to the subject the matter appears to be of transcendent importance, involving as it does the whole question of our attitude towards each other as human beings, our understanding of the great race question, the limitations of education in the elevation of races, and the understanding of the fact, which is being continually lost sight of, that acquired characters are not inherited, and that education affects only the generation to which it is given. . . .
>
> "This collection of photographs of some of the more interesting of the 150 photographs of twins is published with the object of bringing to the attention . . . the existence of thousands of human beings who have gone through changes of environment which we have been in the habit of considering sufficient to account for all sorts of effects without varying enough in their likeness to each other to make them easily distinguishable."

Now it would seem a rather bold deduction to say that this bodily likeness is a guarantee for complete identity of personality. That real changes of environment, with accompanying differentiated opportunities for education and selfexpression, may bring about differences in the reactions of the twins, is at least as much of a fact as the claim that acquired characteristics are not inherited. This latter fact is still much under discussion, and the Weismann theory, upon which the assumption is based, has been opposed in many places. I may be allowed to refer to many of the statements brought forth at the recent Second International Congress of Eugenics, held in New York, and to my own paper read at this congress on Limitations of Present Theories.

Even the bodily likeness of identical twins is often very superficial. Strangers may not easily tell them apart, but their parents can. An article by Dr. D. H. Danforth, of the Washington University School of Medicine, on Resemblance and Difference in Twins, in the same issue of the *Journal of Heredity,* contains further material for careful thought and study. He says:

> "Some of the photographs reproduced in this issue bear witness to the remarkable degree of facial resemblance that may exist between twins, while others illustrate the fact that twins are sometimes surprisingly dissimilar. What the photographs show with reference to facial resemblance, the questionnaires filled out by the twins themselves show for other traits, both physical and mental. . . .
>
> "Perhaps the matter of right and left handedness should not be passed over in this connection. Rather a surprising number of twin pairs seem to be composed of one right and one left handed individual. It has been suggested that one twin is frequently the mirror image of the other, left handed and with heart and other viscera reversed in their symmetry. The responses to the questionnaire do not show definitely whether or not this condition, known to anatomists as *situs inversus,* occurs in any of these twins. Some persons believe that right or left handedness is an acquired characteristic and not hereditary. While this position probably cannot be maintained, it may be of interest to recall that twin babies generally face each other in their beds, and if care is not taken to change them about frequently their heads become asymmetrical on opposite sides. This may possibly affect the hemispheres of the brain differently and certainly influences the amount of use that is made of the left hand in one infant and the right in the other. . . .
>
> "The same resemblances and differences obtain with reference to mental traits as are found for characteristics that are generally thought of as more purely physical or physiological. Over and over the two twins of a pair enumerate virtually the same list of preferences and aversions. One pair of twin girls heartily dislike mathematics, while another pair record it as their favorite study. One twin mentions that not only do she and her sister commonly dream about the same person at the same time, but they dream the same thing about them. She states that this happens even when they are in different places. . . ."

It may be questioned whether statements of this kind are absolutely reliable. It is a common experience of those who work with questionnaires that answers are often suggested by the questions themselves, and by other factors. Again, twins have from the cradle up so many common experiences and are so much thrown together in their child life, that mere imitation may play a great part in these similarities of likes and dislikes. Even facial resemblances are often the result of persons living closely together, as married couples do, with common experiences and reactions. Many twins, says Dr. Danforth, state that their fondness for each other far exceeds their liking for other brothers and sisters, another phenomenon which need not be explained by hereditary conditions alone.

Although Dr. Danforth, in recalling the familiar assumption that there are two classes of twins, those derived from a single ovum and those derived from two separate and independent ova, also stresses the importance of heredity, he asserts:

> "It cannot be maintained, however, that heredity is the sole factor in determining the characteristics of the individual. Thorndike has found, for example, that many twins which are undoubtedly binovular in origin resemble each other more than they resemble their other brothers and sisters. While this is not Thorndike's conclusion, the observation might be interpreted as indicating the possibility of an environmental influence. Since it is also to be observed that uniovular twins are never quite 'identical,' it is conceivable that their differences might be due to environmental factors. How far such similarities in the one case and differences in the other are in reality directly induced by the environment cannot be easily answered. A few considerations bearing on this question may be of some interest. In this connection there are three questions that it may be profitable to consider: 1. Are the resemblances of uniovular twins confined to certain traits or does the similarity pervade their whole being? 2. Apart from environmental influences, how great is the similarity that may be expected between binovular twins? 3. How great are the differences that may be expected to appear in uniovular twins? . . ."

There is reason to believe, according to Dr. Danforth, that the resemblances of twins involve all parts and systems, but there is some indication that the total resemblance is due to the sum of the many similar special traits which, added together, give the individual his character. And he insists that it is not unusual to find differences in either type of twins. The degree of resemblance will vary widely, owing to the great number of possible combinations of traits from the maternal and paternal germ plasms. On the assumption that chromosomes maintain their individuality and that crossing over does not occur, it is estimated that no less than 4,096 possible kinds of germ cells are produced by a given individual of either sex. This computation is based upon the law of chance, which forms really the basis of the entire Mendelian theory of heredity. It is not quite clear, however, how Danforth applies this assumption to uniovular twins.

Danforth takes into consideration that most pairs of parents have many points in common, perhaps selecting each other on the basis of community of physical as well as mental traits, and so the possible average of combinations is somewhat reduced, and the likelihood of children with similar germ plasms correspondingly increased. The following argument is of interest:

> "While known facts furnish a basis for understanding the marked similarities that sometimes exist between binovular twins, considerable difficulty is experienced in explaining the differences that occur in twins known, or assumed, to be uniovular. Why are these twins not actually identical? The answer to this query must wait, but there are a few points that may throw some light on the question. In the first place, it is a matter of common observation that the two sides of the same individual are by no means identical. It may be recalled that a few years ago it was a fad with certain newspapers to secure full face views of prominent people and, dividing them in the median line, reproduce a left side to correspond with the right, and a right to correspond to the left. The faked pictures were then printed showing Mr. Blank as he would look, a, if the left side of his face were symmetrical with the right, and, b, if the right side were symmetrical with the left. The hair line, the arch of the eyebrows, the shape of the eyes, the ears, and the mouth, the facial expression, were often very different in a and b, so much so that in some cases the two pictures would hardly have been supposed to represent uniovular twins. Anatomists are familiar with the rather frequent departures from symmetry in bilateral muscles,

nerves, and vessels. Occasionally individuals occur with one blue and one brown eye, and indeed it is probable that all symmetrical parts of the body are subject to occasional unilateral variations. The origin of these variations, however, is probably not environmental in the usual sense, since here the environmental factor is reduced to its minimum.[1]

"Whatever may be the causes of variation between the two sides of the body when they develop together as a single individual, it is reasonable to expect that they will be equally effective when each half of the blastoderm develops as a separate individual. It might, therefore, be predicted that uniovular twins would differ from each other in the same respects and to the same degree as the two sides of the body differ in ordinary individuals.

"Whether the fact that a twin is developed from only a part of the ovum while the ordinary individual is developed from all of it makes the two sides of the twin any less variable is not definitely shown, but Professor Wilder makes the interesting suggestion that it does and that twins are therefore apt to be more symmetrical than ordinary individuals."

On the other hand, Dr. Danforth repeats his statement that uniovular twins may be decidedly different in several points, so that they are not identical in the strict sense of the word.

Professor Wilder, whose statement was quoted, has a technical treatise in the same issue of the *Journal of Heredity* in which he shows that uniovular twins show striking identities in the friction skin configuration in palm and sole prints, while the binovular twins show a lesser degree of similarity. He uses the entire palm and sole instead of mere finger prints, or toe prints, because he obtains thus a larger area for comparison.

Dr. Woods, whose words have been quoted above, has another contribution which throws some more light on the relative importance of heredity and environment. What twins prove, he says, is this: the lack of importance of environment, but only in one aspect and in one restricted meaning.

"In a sense, environment is all important, for without nourishment, oxygen, and warmth, growth is impossible; and without training, education, and social control, the development of the higher traits would not take place. But this environment is customary and expected. The question of practical interest is: How far do changes in the customary environment produce measurable modifications? In order to prove that a modification is due to an environmental change it is essential that the heredity (or chromosome) factor should be a constant. This requirement may be sometimes attained by using a large number of individuals whose average heredity may be reasonably supposed to be the same. For example, there cannot be any doubt that the striking differences in the growth of dogs, sheep, and other animals, when given greater and smaller amounts of glandular extracts—thyroid, etc.—are really caused by these environmental forces, i. e., a difference not caused by chromosome differences.

"The great lesson derived from the records of identical twins is that the ordinary differences within the uterus of the mother and the ordinary differences within the home life and school life and even adult life are not of sufficient force to modify greatly (!) the control of the chromosomes. The nonidentical or fraternal twins have the same chance to become similar through environmental action as the identical, yet they are not so moulded. Photographs show this in the most obvious manner, and if, as appears from the records of the questionnaires, the resemblances are no greater in physical than in mental aspects, then the farreaching inference is forced upon us that even mental and moral differences are controlled by forces lying in the primary chromosomes.

"This does not mean that great changes in the environment may not cause considerable modification in the individual; but the point is that great changes are not usual. The very fact that they are great is associated with their scarcity, and under usual conditions of life the physical and mental differences that we commonly observe among our fellow beings are really due to differences traceable in the chromosomes themselves."

This argument does not seem altogether conclusive. At best it means that we cannot harvest figs from thistles, or change a pine into an oak. An improvement of the race cannot be accomplished in a day; it requires, not always great, sudden changes, but an accumulation of forces which are at work for generations. Besides, a vast portion of modern society has been submerged for centuries, and undoubtedly possesses hereditary powers which only need the right opportunities for unfolding. These are the elements of hope in human evolution.

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[1] If we exclude the environmental conditions of the fetus in utero. G.

The Relationship of Precordial Distress to Extracardiac Conditions*

By EDWARD C. REIFENSTEIN, M. D.,

Syracuse, N. Y.

(*Concluded from page 223.*)

The constriction in the chest is usually complained of under the sternum between the sternoclavicular joints on either side extending half way down the substernal region and so severe as to require sitting up in bed. It may be increased on a cold day, also after excitement, or emotion, sometimes felt directly after a night's rest. It may be so severe that the patient is very uncomfortable and anxious. It may occur after fatigue. But it is variable; some days may pass without it, again it may be so severe as to keep the patient in bed.

Case V.—I saw such a case in a man who was in bed for two weeks. He was a hard worker, played but little. He had been under severe mental strain, and noticed that he lost interest in his work. It grew irksome, then he suffered from exhaustion, marked irritability of temper followed by marked depression, then he had attacks of loose bowel movements, associated with mucus, small marblelike formation, and at times ribbonlike stools. Next he noticed that he could not go upstairs without becoming dyspneic. He also noticed pain in his left arm and then finally the sensation of constriction in the upper chest affected him. He was considered nervous, as he had overworked and had beginning arterial changes. He was kept in bed for two weeks. He kept getting worse and finally his tonsils were removed as one of them was filled with pus. The next day following the operation, the constriction disappeared and has not recurred. At no time did he have any abnormal physical signs, but had the etiology been more carefully gone into, it would have been found that two days before going to bed he had had a sore throat, and throughout the attack he had tenderness in the neck over several glands.

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*Read before the Syracuse Academy of Medicine, February 15, 1921.

Latent infections remain in the body until fatigue plays a rôle in giving them a chance to overwhelm the patient.

CASE VI.—A man, aged forty years, suffered from severe constriction in his chest, which was aggravated by exertion. Associated with the constriction was some pain up into the vessels of his neck. Examination revealed a man, weight 230 pounds, height 5 feet and 7 inches, blood pressure systolic 190, diastolic 100; a rough systolic murmur was heard over the aortic area. The second aortic sound was ringing. Various tests for renal function were normal. His blood chemistry had normal readings. He was given a diet to reduce his weight, which brought about some but never entire relief from his symptoms. Five years before he had been treated for renal colic. During the treatment for the reduction of his weight he was seized with another attack and an examination revealed a stricture of his left ureter with hydronephrosis. This was treated and gradually the pelvis of the kidney became smaller. His general condition improved. He lost his dyspnea and constriction and the blood pressure became normal.

Syncope is another symptom which leads to consultation with the physician. Frequently an attack of syncope has been labelled an acute heart attack, especially if an irregularity or murmur is heard over the precordium. This may be due to some intestinal disturbance especially in children, or may be of vagus origin producing anemia of the brain, or may mark the onset of an acute infection such as acute pyelitis. Some susceptible individuals may faint in a smoke filled room, others may faint from sudden emotion, mental strain, or severe pain, such as gallbladder, renal or uterine colic. A physician, called to attend the patient in a faint, invariably first uses the stethoscope and if he should happen to hear an irregularity or a murmur over the precordium, the attack is usually considered of cardiac origin. Cardiac remedies are prescribed and many times this is the beginning of chronic invalidism.

Christian and Mackenzie (1) call attention to the significance of venous stasis of the abdominal veins as a cause of syncope. They use as a test pressure upon the abdominal contents, and note whether a filling of the jugular vein occurs. This has a practical application in that many individuals of a ptotic type are frequently seen who present the history of recurrent attacks of syncope.

Another symptom of the complex to be considered is shortness of breath, a complaint which requires careful study and analysis. One must consider the various causes of dyspnea, mechanical, chemical, respiratory, cardiac, toxemic or anemic. In no class of cases is greater error likely to occur than in these, especially inasmuch as dyspnea is one of the chief symptoms of a failing heart. The heart is usually first considered and examined, and if there happens to be present an irregularity or slight murmur, digitalis medication directed toward the heart muscle is prescribed.

The importance of etiology in producing an exhausted muscle should be constantly considered. The question of stimulation of the respiratory centre by diminished amount of oxygen and increased carbon dioxide should be carefully considered.

Lately the physical chemists have called attention to one possibility; that is, that the bases in the blood are disturbed. MacLeod (8), however, asserts that this does not explain all the cases. French (9) mentions sixty-four different diseased conditions in which dyspnea is found. The extreme dyspnea in cases suffering from primary anemia is only one of the many examples which might be cited to show the relationship of a disease outside the heart to dyspnea, which usually has associated with it some physical sign referable to the heart.

The pressure of a strumous goitre upon the trachea causing extreme dyspnea is a case in point. Were one to consider the dyspnea as cardiac in origin because of a murmur and some enlargement of the heart which is usually found, a serious error of interpretation would be made. Dyspnea is sometimes found in nervous and obese people. The estimation of the vital capacity of the lungs according to the suggestions of Peabody and Wentworth (10) is of value in determining the degree of dyspnea from which these patients suffer.

The disturbance of the rhythm of the heart sometimes influences patients to consult a physician. The following case is of interest:

CASE VII.—A man of fifty-three years, complained chiefly of irregularity of heart with an abdominal distention. These attacks have occurred every two or three months for five years, usually associated with a slight temperature. During the interval he was as well as he ever was. He had taken digitalis constantly for five years. He was conscious of a rapid and irregularly beating heart. His previous history was negative except repeated attacks of tonsillitis each year. Examination revealed marked oral sepsis with two badly diseased tonsils. His apex beat was found in the sixth interspace fourteen cm. to the left, right border four cm. Dulness at the second rib eight cm. wide, heart irregular, the pulse was 120, the rate over the mitral area was 180; in addition one could hear an occasional extra systole. The condition of auricular fibrillation was diagnosed. A rough systolic murmur was heard over the second right interspace, aortic second sound slightly ringing. Over the mitral area the first sound was replaced by a blowing systolic murmur transmitted into the axilla, second sound present. Blood pressure systolic 130, diastolic 66. The arteries were tortuous. X rays confirmed the findings of an enlarged heart of the aortic type. He was kept in bed under digitalis treatment which soon produced a normal rhythm; an occasional extrasystole occurred. He had no dyspnea or pains at any time. After he recovered, his tonsils and some abscessed teeth were removed. He has remained well for over a year, without attacks, and is not conscious of his heart.

This teaches the lesson that even with definite findings of a heart condition one should endeavor to find all foci of infection and remove influences which exhaust the heart muscle.

The relationship of a group of these symptoms complained of under the various titles of effort syndrome, irritable heart, neurocirculatory asthenia, soldier's heart, disordered heart action is seen quite commonly. It was necessary for the experience of the late war to call our attention again to the common condition. Da Costa during the Civil War had studied it carefully and Christian and Mackenzie (1), Lewis and others in the late war did likewise. The observations of all were somewhat similar. There are certain individuals of vasomotor instability. They cannot stand emotions or excessive strain. Some belong to the type of an individual called visceroptotic. Christian and Mackenzie (1) do well to call attention to the emotional feature being that of general exhaustion. Various infections have been given as causes; chronic foci of infection were found.

The relationship of secondary anemia to some of these subjects is interesting. In the southern camps hookworm was quite commonly found. Only a small group suffered from hyperthyroidism.

Shortness of breath, exhaustion and fatigue were prominent symptoms. Fears of sudden death and the certainty that the heart was affected were pronounced features. The patients were extremely apprehensive, constantly complaining of being all in. The importance of etiology in the course of these conditions is obvious.

The question then naturally arises as to what can be done to enable one to separate the cases which are purely cardiac from the large group in which there is some etiological factor outside the heart.

The carefully taken history is all important. It is surprising how a patient will change his history within an hour's time. It is sometimes a very difficult matter to have the patient express what his real complaint is; that is, the subjective sensation which he experiences. Oftentimes he will call it a disease, such as goitre, rheumatism, la grippe, asthma, kidney, stomach, bladder or bowel trouble, and indeed heart trouble.

I personally believe that more physicians have been misled by taking these statements than by any other means. It has been my practice to have someone write the history, and I follow it up by checking each item. I have been impressed with desire upon the part of some patients to put forward what they consider important either from what has been their experience with other physicians or what they themselves consider is their trouble. It requires considerable time, but when they see and know how actually necessary it is as a part of the diagnosis, they usually assist a physician. There is a similar danger when a specialist in taking a history tries to bring out socalled leads along his line. The history should be as far as possible uninfluenced by the physician until after it has been given by the patient. The internist who is not one sided with reference to any one system or organ in the body is particularly fortunate in this respect. Very few diseases are typical or of textbook character and the internist must have the ability to sift from the history those things which establish a clue and enable one to follow the possible etiological factor, or many likely factors as many cases have. Particular attention should be paid to the incidence of ,the complaint, under what condition it arose and its course.

After the history has been carefully taken it becomes essential to examine the patient. A careful physical examination requires time. Familiarity with the normal is a prerequisite part of physical examination. The greatest aid in physical examination is inspection, and usually it is the least one practiced. How can one detect conditions by inspection if the clothing has not been removed? Inspection as well as the other physical methods of examination are of just as much value when negative as when positive.

Recently it has been stated in trying to accentuate the history taking that the physical examination is of less importance. This is in accordance with the teachings of Christian and Mackenzie (1), who made the statement that the stethoscope had done harm. There is no question as to the correctness of this statement, but if we go to the other extreme of lessening its use, where will we be? There is no harm in its use. The great harm is in the quick interpretation made from the findings secured by its use. Now we are in a period of laboratory diagnosis. Men are not the close observers of the clinical course of the disease that they were. The x ray has been to some men a short cut to diagnosis.

And now comes a greater refinement of it to localize gallbladder, kidney, and the like. That it is a valuable aid no one will dispute, but that it should be used before other methods of physical examination, particularly inspection, is absolutely harmful.

Laboratory findings in relationship to etiology are important; not always positive findings, but sometimes negative findings are valuable. The history of previous infection is important. The careful interpretation of laboratory findings as well as of all instrumental evidence including the blood pressure is essential.

After all of this has been done a summary of the complaint and its associated symptoms together with a careful analysis of the findings made by physical examination and laboratory aids should be made and an attempt made to connect the relationship of all etiological factors, first with the complaint, and second with the evidence obtained by examination and from the laboratory.

CONCLUSIONS.

Therefore, I would suggest in these cases of precordial distress: 1. Etiology be carefully studied. 2. Closer attention be paid to dysfunction of various organs, so that we may get ahead of the terminal structural changes if possible. 3. Because a physical finding referable to the heart is usually associated with structural changes; not to conclude that the particular complaint is referable to that structural change. 4. A carefully written history is important especially if one goes over it a second time. 5. A complete physical examination with special emphasis upon inspection is necessary. 6. While instrumental evidence is valuable, an attempt should first be made to determine the condition by other methods. 7. Laboratory evidence should be considered for its negative as well as its positive value.

A complete list of references will appear in the author's reprints.

Editorial Articles

THE VOICE.

To one who has met a number of acquaintances after an interval of many years the changes wrought by time in their external appearance and bodily movements is always notable, often painfully surprising. The hair (where it has not taken on a puzzlingly nondescript color from the use of dyes) has become whitened, the skin is bronzed and wrinkled, or padded and smoothed out by accumulated adipose; the eyes have lost their lustre and are prefaced by glasses; the teeth are questionably natural, if they are as numerous as formerly; the hearing may be dulled; the facial and bodily movements are slowed apace and the form may be stooped. Those changes are so manifold and striking that we are inclined to overlook the persistence through the years of the quality of the voice, and yet this one fixed feature is sufficiently remarkable to offset the many which have undergone decided change. Even those who have lost most semblance to their former selves have not lost to any extent the peculiar quality of their voice.

When one notes that the organs which, in their functioning and, hence, in their structure, have so endured, are relatively small and delicate and in very frequent use, the phenomenon is of greater interest. A vocal apparatus may be injured or worn by overuse, and the power of a singer does not last for life. But, though its flexibility, power, and range may diminish, for ordinary purposes the quality of speech remains easily recognizable and apparently but slightly influenced, compared with the all too apparent decay, destruction, or less pronounced change which has gone forward in other tissues, with the passage of a decade or two.

If the quality of the voice does not change appreciably with the years, neither can it be changed to any great extent by any vocal gymnastics. Numerous are the "methods" and "systems" advertised with this end in view, but they are futile. Great singers are born, not made. Quite true, training may (though often it does not) help to develop volume, suppleness, and range of utterance, but the quality changes but little if at all.

So much for the voice in health. As a delicate indicator of ups and downs of physical vigor from day to day, it is even as remarkable as in the persistence of its timbre through the years. The changes here are not so much those of quality as of vigor. The strength of the voice would seem to be a guide to the general forcefulness of the personality behind it, and strength of personality is, at bottom, a thing of physical combativeness or of retirement. A clear, crisp speech denotes, in general, vigor, and a state of being at or above par; a weaker, mumbling, low pitched voice indicates physical or mental depression and the more certainly if it has ordinarily more of the character before mentioned. Of course we all fall into habits of speech, of using the voice, but these habits usually have their origin in some physical condition, past or present.

That there should be such temporary and slight changes in the voice whose timbre remains apparently identical from year to year is to be expected, since the mechanism for its management is so manifold and so intimately associated centrally with the general controlling centres of the nervous system. The vocal cords do not easily change, but their controlling machinery is one with the machinery of our emotions.

As a delicate test of the condition of a patient the voice might be given more careful observation than it generally receives. Particularly is it of value as a test of fatigue in subjects suffering from long illness, and is an indicator of the amount of general exertion of which they are capable. It is telltale also, to a considerable degree, of the mental condition of the individual, reflecting more certainly than the facial features the states of depression or of buoyancy as they may exist from day to day.

LESIONS OF PERITONEUM.

Among the nodular inflammatory lesions of the peritoneum simulating tuberculosis of this serous membrane, a special variety merits individualization under the term of hydatid pseudotuberculosis. This process is the result of intraperitoneal rupture of a hydatid cyst with the result that the echinococcic elements become disseminated and act as specific foreign bodies. From their aspect and distribution the granulations characterizing hydatid pseudotuberculosis objectively recall true tubercles. The analogy continues microscopically because the nodular lesion is composed of round cells, giant cells and epithelioid cells. But besides not containing the bacillus of tuberculosis the reactional nodules are characterized by echinococcic elements which give them their pathognomonic signature.

Two types of hydatid pseudotuberculosis are to be distinguished because of their very different significance and prognosis. The first contains inactive débris of parasite formations arrested in their evolution, in other words, cured pseudotubercles. The second type, on the contrary, is composed of small vivacious echinococcic vesicles, representing the primary evolutionary phase of secondary cysts. The two types are usually combined.

Looked at from the viewpoint of general pathology, echinococcic pseudotuberculosis of the peritoneum represents a reaction of defence of the organism in respect to parasitic foreign bodies in the serous membrane. This process is not confined to man. It has been observed in the spontaneous process in animals, especially dogs and monkeys. It can be easily produced experimentally in rabbits and guineapigs.

An essentially local lesion causing us general irritative reaction in the abdominal serosa and having no effect upon the subjacent organs, hydatid pseudotuberculosis has in itself no symptomatic expression. But usually associated with hydatid choleperitoneum or with secondary echinococcosis of the abdominal and pelvic cavities, it occasionally assumes the clinical aspects of tuberculous peritonitis. The presence of peritoneal granulations is almost always a discovery at operation, so that the process should be known to the operating surgeon.

The microscopical diagnosis will be easy when the granulations coexist with hydatid cysts of the peritoneum. The nature of the lesion will also become clear when an aseptic bilious collection is present in the peritoneal cavity—Dévé's hydatid choleperitoneum—but the diagnosis is difficult in the absence of these two conditions. A histological examination is indispensable in order to ascertain the precise nature of the granulations, all the more so because an authentic tuberculous peritonitis has been met with in cases of intraabdominal hydatid cyst. A biopsy alone can give the necessary data as to the progressive or cicatricial character of the lesions, that is to say, the ultimate outcome of the case. In point of fact, the prognosis will differ if the case is one of healed pseudotubercles or a secondary vivacious echinococcosis. However, it is to be recalled that even in the latter alternative the ulterior development of the cysts is not absolutely certain, because a process of spontaneous involution may take place, ending in recovery.

During surgical intervention for hydatid cysts of the liver or spleen, the surgeon should systematically search for the possible existence of a hydatid pseudotuberculosis of the peritoneum in order to be on his guard for the future development of these hydatid peritoneal crafts. The practical prophylaxis for this process is to operate in every case of hydatid cyst as soon as the diagnosis has been made in order to prevent spontaneous rupture of the cyst. Therefore, puncture should disappear from practice which may cause an artificial inoculation of the peritoneum.

As to the dissemination of hydatid germs during surgical operation it can be avoided by carefully protecting the peritoneal cavity, combined with a previous injection of Dévé's parasiticide serum, now very generally employed. The composition of this antiechinococcal serum may be found in the *Compte rendu de la Société de Biologie,* January 24, 1903.

WHAT IS AN EPIDEMIC?

"The disease is epidemic." "The disease is not epidemic." "The disease is epidemic." Year after year we hear these statements from health officials, uttered not in succeeding breaths, perhaps, but in breaths of succeeding days. They remind one of the harlequin who rushed upon the stage with a bundle of papers under each arm. When asked what was in one bundle, he replied, "Orders!" and when asked about the other, answered, "Counterorders!" What is an epidemic? or when is an epidemic? If health officials do not know, who does know?

An epidemic disease is not different in nature from the same disease when not called epidemic. Scarlet fever is scarlet fever and influenza is influenza. If there is any difference in the infectious agent, it is only a matter of more or less of its native qualities. There is nothing new about it. If there is any difference in those infected, it is again only a matter of more or less resistance. There is again nothing new or original in their state. There is an altered relationship between host and parasite, but there are all degrees of alteration. In other words, the law of relativity holds in infectious diseases as elsewhere. What is now an epidemic of smallpox was a normal state of affairs a century ago.

There is no drawing the line between epidemic and nonepidemic disease, and there would be a more rapid advance in health matters if we were to do away with the words epidemic and endemic, or use the word epidemic for all communicable disease. We seem perfectly content, at least the public does, when a disease is not pronounced epidemic, but when that name is applied by official authority or, more often, by popular decision, there is suddenly much alarm and much precaution taken to avoid the disease and to prevent its spread. And yet, in its ordinary every day—every year—run, the communicable disease carries off some fourteen times as many lives as in the briefer days or years when it is pronounced epidemic. The disease, then, in nonepidemic form, whatever that may mean, is fourteen times as much to be dreaded as when it is called epidemic, whatever that may mean.

It is high time for health officials to cease quibbling about the existence of epidemics and turn their attention to the stimulation of greater interest in the ordinary incidence of communicable disease. Let the public consider any number of cases an epidemic. We should be thankful if their public health consciousness has reached such a developed state that they are readily alarmed.

VENEREAL DISEASE.

To say that the problem of successfully dealing with venereal disease is one of the most insistent of the present time, is to grossly understate the case. It would be no exaggeration to assert that it is the most important medical question of the world. Perhaps it is hopeless to imagine that venereal diseases can ever be stamped out, but there is every reason to predict with confidence that their spread can be greatly stayed. There are two modes of effecting this purpose, first, by prevention, and second, by prompt and effective treatment. In no other disease can the old axiom "prevention is better than cure" be more aptly applied than in venereal disease. The crux of the matter is, how may preventive measures best be put in force.

As is no doubt known to the readers of this journal, there has been going on for some time in Great Britain a controversy between eminent physicians and surgeons as to which is the most effective way of coping with these diseases. The National Council for Combatting Venereal Disease, which has official sanction, is opposed to immediate selfdisinfection, a method which the Society for the Prevention of Venereal Disease holds is the only one which can really prevent infection. The laity, or at least those who take an intelligent interest in the subject, and the medical profession are divided into two camps and despite all efforts to bring them together, even to some extent, there are few signs of harmony. The National Council appears to be unalterably antagonistic to selfdisinfection and up to the present time have refused to avail themselves of any means offered which might tend to a compromise.

A short time ago Lord Dawson, one of the leading physicians of Great Britain, proposed that there should be a round table conference between representatives of each society. The Society for the Prevention of Venereal Disease accepted the proposal with alacrity but the council has taken no steps in this direction. If selfdisinfection will, to some extent, prevent the occurrence of venereal disease, it seems that the method should not be neglected, for, after all, as said before, prevention is in every respect superior by far to any treatment, however successful.

The manner in which the venereal problem is grappled with in Great Britain will be watched with intense interest in this country, as the fact that it is an international matter cannot be too strongly emphasized. Why not an international conference o. the question, to which the advocates of immediate selfdisinfection would be invited and allowed to plead their cause? It is not only in Great Britain that supporters of this mode of prevention are to be found and certainly nothing is to be gained by muzzling them or by treating their proposals as if they had been proved unworthy of consideration.

REALITY.

A few of the more pious, yet thoroughly uneducated among us, still object to the ancestry of the ape. When we analyze the emotional effect which such an admission would bring an understanding of their attitude supplants our wonder. Yet the most radical of these *demicivilisé*, the most puritanical, do not deny that at a time not so far remote as to defy study our progenitors were what we might call primitive men. For the purposes of our present discussion this will suffice. We must also consider, for the moment, another type of mind, which relinquishes whatever grip on reality it may have and indulges in doctrines of spiritism, occultism and in a fairly long list of theories which deal with supernatural phenomena. The origin of this mode of thinking can be found in primitive man and in his evolutionary prototype, the child. Anthropologists have studied this mental process and labelled it animism, the belief in demons, and the general primitive concept of the soul. Primitive religions originated from these doctrines. Evolution guided by the development of man's knowledge transformed these crude religions into the more intricate ones, the most highly developed ones of today.

The antics of the soul have always been a source of wonder to man. The mysteries of life and death caused great speculation. The dream played an important rôle. The savage who in his dreams wandered off in the pursuit of his favorite pastime in the midst of deep slumber was easily convinced that it was his soul which found release in his hours of sleep. If sleep gave freedom to his soul, death, a condition to his mind analogous to sleep, should bring the same freedom. The child finds difficulty in separating the animate from the inanimate. To the child all things live. The savage also finds trees, stones, sticks and all manner of inanimate objects full of life and spirit. Those whom we call insane, for purposes best known to themselves, frequently continue in these phylogenetic and ontogenetic infantilities and animate all of the objects in their immediate surroundings—chairs, pumpkins, knives.

Disregarding the limitations which were imposed by the belief in supernatural phenomena scientists breaking through the veil of scholasticism continued their quest for the understanding of reality. Their findings brought results beyond that of the fondest phantasies of the savage, the child, or the psychotic. They made it possible for us to listen to the voices of the departed, they made the dead play the piano, they recorded the tremblings of the earth, they prophesied with accuracy the future position of the stars, they made it possible for us to hear voices and music in the remotest quarter of the globe—merely by the stretching of antennæ. They flew where the birds did not venture. Truly their works were greater than the desires of the inane chatterers, those who held to their belief in spirits and spiritism.

Never once did they forsake the realms of reality. We might add that their work is only begun. Stronger imaginations than those of the spirit seekers could not foresee the results which science will bring to the future.

Why is it, then, that in the midst of all these wonders socalled intelligent men continue their search for spirits? Can it be that reality is too powerful for them? Is it because they seek a world where they will be all powerful? Surely they must have a reason. There must be a reason and a cause. They are seeking some goal even though they are avoiding the goals of reality. Again we may ask what may this goal be?

CUTANEOUS EPITHELIOMATA.

Although by no means a novelty, the treatment of epitheliomata of the skin is an important subject and the recent advances made along these lines should be known. Scraping the neoplasm, followed by x ray radiations, has stood the test of time. This procedure was at first used only in the case of large, exuberant, papillomatous epitheliomata by Belot, Brocq and others, and the results have been so good that at present this treatment is resorted to systematically in almost all cases of this skin lesion. It is true that the x rays alone will cure many cases but given a vegetating neoplasm it is both simpler and more rational to prepare the way for radiotherapy by the use of the sharp spoon.

In order to be successful with the x rays a high dose is necessary, not only for destroying all the vegetating epithelial proliferations, but especially for sterilizing the deep stratum, the base upon which the neoplasm rests and in which it tends to proliferate. By exposing the defensive tissue on which cutaneous epitheliomata lie, the majority of malignant elements are removed, thus permitting the rays to act directly, rapidly and thoroughly on that portion of the neoplasm which should be first attacked. Thus, the total dose of x rays necessary for a cure is singularly reduced while cicatrization occurs more rapidly and with a nicer esthetic result than that produced by excision. It is also said by competent observers that recurrences are less common.

Before curetting, the growth should be carefully cleansed by moist dressings, followed by the application of tincture of iodine. Infiltration anesthesia is employed. Scraping should be done with the sharp curettes used in dermatology and should be of different sizes. The vegetations are first removed with a fairly large spoon and then with smaller spoons the edges and the base are scraped. It will sometimes be necessary to enucleate carefully the fungous elements or epithelial pearls embedded in the fibrous tissue of defense. Healthy tissue must be respected and all that is necessary is to remove the neoplastic tissue. Hemostasis is usually spontaneous but bleeding is controlled by pressure with a gauze pad.

Radiation should be done immediately with a massive dose of unfiltered rays, the quantity varying, according to the case, from ten to fifteen H. units. It is important to kill at once all the neoplastic elements which have not been removed by scraping, but in deciding upon the dose, the region, state of the skin, and extent of the lesion must be taken into consideration. No matter what dose is used the radiation should include about six or seven millimetres of healthy skin bordering on the raw surface. In about a fortnight after this treatment the ulceration will be found flattened and epidermization will be advanced when it is not complete. Twenty to thirty days after the first treatment a second radiation is given, the dose varying, from four to eight H. units, but this time the rays are filtered through two to three millimetres of aluminum. This is repeated three weeks later, at which time cicatrization will be complete. One or two additional radiations are given to complete the cure.

Belot has treated over one thousand cases by this method since 1903, and states that he has had not over fifteen per cent. recurrences and among these are to be included those patients who did not follow the treatment with regularity. This method gives ninety to ninety-five per cent. successful results, a percentage unattained by any other procedure. It is perfectly true that the spindlecelled epithelioma is the most serious and frequently uninfluenced by the x rays alone, but very deep preliminary scraping will greatly help in the results. In rodent ulcer this treatment greatly diminished the chance of recurrence, while concrete sebaceous acne is also benefited by it.

SIMPLIFICATION.

Efficiency and simplification are the keynotes of the present. Anything which tends to shorten the hours of labor is received with fervor. Certain old fogies in the world of science, and even in the medical field, are making all manner of fun of the efforts of certain businesslike legislators in Kentucky who think it best to avoid the study of evolution in their schools. Can they not see how this law would simplify medical learning? This would only be a beginning. If history may be relied upon, it was a physician who foisted this new fangled idea of evolution upon an unsuspecting world. Why should we as medical men carry this everlasting burden? He presented his evolutionary theories in the form of a poem *Zoomania*. Why then should we socalled scientific men be the victims of a poet and one of our own colleagues? Why could he not write poetry about stars or rainbows if he had an itch for this particular dissipation? It is time that we emancipated ourselves from the shackles of this form of slavery. Hail the Kentucky legislators who wish to free us from the tyranny of poetry. By the elimination of evolution can be seen the foreshadowing of many other reforms of value. If they are successful, then a campaign would follow to do away with chemistry—or perhaps anatomy, for that would be the next evolutionary step. However, we must be careful not to use words like evolutionary; they smack too much of the very thing we are trying to avoid; but habits are strong. At any rate the effort should receive the support of every man of science who wishes to lighten the burden of the coming generation of scholars.

News Items.

Missouri Hospital Association.—This association was organized in St. Louis on February 17th. Dr. Louis H. Burlingham was chairman of the committee on organization.

The Cutter Lectures.—The Cutter Lectures on Preventive Medicine were delivered at the Medical School of Harvard University on February 14th and 15th by Dr. Alfred F. Hess, clinical professor of pediatrics, University and Bellevue Hospital Medical College.

Herter Lectures.—Dr. W. M. Bayliss, professor of general physiology, University College, London, is giving this series of five lectures at the University and Bellevue Hospital Medical College, under the Herter Foundation, on Interfacial Forces and Phenomena in Physiology. The first two lectures were given on February 27th and 28th and the other three will be given on March 1st, 2nd and 3rd.

Rockefeller Gift for London School of Hygiene.—The Minister of Health announces that the Rockefeller Foundation has offered to provide $2,000,000 toward the cost of building and equipping a school of hygiene in London. This offer is made on the understanding that the British Government shall accept the responsibility of providing for appointing the staff and maintaining the school when established.

Personal.—Dr. Earl W. Fuller has succeeded Dr. William C. Sandy as psychiatrist of the State Commission for Mental Defectives.

State Campaign Against Diphtheria.—The New York State Department of Health is conducting an aggressive campaign against diphtheria through the extensive use of the Schick test, in cooperation with local health and school officials, and the Red Cross Society.

Seventh Harvey Lecture.—Dr. William M. Bayliss, professor of general physiology, University College, London, will deliver the seventh Harvey Society Lecture at the New York Academy of Medicine, Saturday evening, March 4, 1922. His subject will be Vasomotor Reactions and Wound Shock.

Assistants Wanted in Reconstruction Work.—The United States Civil Service Commission announces examinations for reconstruction assistants in physiotherapy and occupational therapy to fill vacancies in the Public Health Service throughout the United States. On account of the needs of the service applications will be received until further notice.

Supreme Court Endorses Lorenz Fund.—The Professor Lorenz Fund, organized to alleviate suffering among destitute intellectuals, professional and clerical classes in Austria, was approved by Supreme Court Justice Nathan Bijur when an application for a certificate of incorporation was presented to him. Professor Lorenz, who has been elected president of the fund, has expressed his approval of its objects. When he came here Professor Lorenz called attention to the condition of teachers, doctors, lawyers and other professional and clerical workers in Austria, and said they, above all others, except children, were most in need of aid.

Died.

BAILEY.—In New York, on Saturday, February 11th, Dr. Pearce Bailey, aged fifty-six years.

BRYAN.—In Philadelphia, Pa., on Tuesday, February 14th, Dr. Joseph Roberts Bryan, aged fifty-seven years.

CALHOUN.—In Cartersville, Ga., on Tuesday, January 31st, Dr. Alfred Turpin Calhoun, aged fifty-nine years.

EVERETT.—In Philadelphia, Pa., on Tuesday, January 24th, Dr. Ella B. Everett, aged fifty-five years.

FLEMING.—In Brooklyn, N. Y., on Tuesday, February 7th, Dr. James Watt Fleming, aged sixty-eight years.

HOLLAND.—In Philadelphia, Pa., on Friday, February 10th, Dr. James William Holland, aged seventy-three years.

LINDLEY.—In Los Angeles, Cal., on Tuesday, January 24th, Dr. Walter Lindley, aged sixty-nine years.

PEEBLES.—In Los Angeles, Cal., on Wednesday, February 15th, Dr. James Martin Peebles, aged ninety-nine years.

RANKIN.—In Brooklyn, N. Y., on Wednesday, December 21st, Dr. John Rankin, aged seventy-six years.

REID.—In Pleasantville, N. Y., on Saturday, February 18th, Dr. Adrian Young Reid, of New York, aged seventy-seven years.

SHOEMAKER.—In Philadelphia, Pa., on Thursday, January 5th, Dr. George E. Shoemaker, aged sixty-four years.

VAN SICKLE.—In Brooklyn, N. Y., on Tuesday, December 27th, Dr. Albert M. Van Sickle, aged forty-nine years.

VINCENT.—In New York, on Tuesday, January 3rd, Dr. Wesley Grove Vincent, aged fifty years.

ZINKE.—In Palm Beach, Fla., on Monday, January 30th, Dr. E. Gustav Zinke, of Cincinnati, Ohio, aged seventy-five years.

JOSEPH BABINSKI.

By Malford W. Thewlis, M. D.,

Paris.

Charcot's chief of clinic. Such was the beginning of the great career of Joseph Babinski, who was associated for a long time with this famous master. At the Salpetrière, Babinski, under Charcot's teaching, became a great clinical observer and specialist in the field of neurology. Today his work is known the world over and his clinic at the Hôpital de la Pitié is a centre where physicians and students from all parts of the world enthusiastically follow his teachings. The Hôpital de la Pitié is one of the modern hospitals of Paris, situated not far from the Salpetrière. It is a very large institution, containing about a thousand beds; a small city in itself.

Joseph Babinski was born in Paris on November 17, 1855. A pupil of Charcot, he later became Charcot's chief of clinic and was appointed physician of the hospitals in 1890. His life work has been dealing with diseases of the nervous system, his first article being published on March 3, 1883. Many great men have reached fame through one particular thing and Babinski's name is perhaps best known because of the so-called Babinski sign. This sign is a curious physical phenomenon called the extensor response where the toes, especially the great toe, bend upward when the sole of the foot is excited, pointing to disease of the nervous system. This was first described by Babinski in 1896 before the Society of Biology, and in 1897 a more complete description was given by him to the Congress of Neurology at Brussels.

JOSEPH BABINSKI.

In 1903 Babinski noted another sign of the toes which he called the fanshape sign. The abduction of one or more toes when the sole of the foot is excited is connected with the extensor response, yet it is not always present. It is rare in normal subjects, but is marked in diseases which involve the pyramidal tracts. It is, above all, very marked in congenital spasmodic paralysis accompanying athetosis. In infants, Babinski observed, the pyramidal tracts are not well developed and these signs, which are abnormal past the age of three, are usually present. Babinski later described another sign of associated abduction of the toes. The patient lies on the back and, after crossing the arms upon the chest, executes the movements alternately of extension of the trunk upon the pelvis as for the combined movement of flexion of the trunk and of the thighs. During the execution of these acts the toes separate from one another. The name was given to this reflex from the fanshape separation of the toes.

One soon becomes very enthusiastic about the work of Babinski after visiting his clinic. It does not seem possible that a man could gain so much knowledge of the reflexes in so short a time. Babinski is able in a few minutes to make tests of cutaneous reflexes. This work alone would make a large volume.

Everyone is welcome in his clinic and foreigners interested in nervous diseases should visit this hospital. In the amphitheatre moving pictures are sometimes shown, which exhibit patients suffering from various diseases and many war neuroses are seen. During the war Babinski did a great deal of work at the Hôpital de la Pitié in war neuroses, hysteria, and the further study of reflexes. Many soldiers when properly treated were made effective again and, considering the large number of men afflicted with nervous disorders as a result of the war, this work became of great importance. Babinski has been able to make an accurate diagnosis in many cases of soldiers injured in the war, the bullet having caused various paralyses. The care of contractures following war injuries was important. In a book which is part of a collection on war surgery, Babinski and Froment have noted many advances in neurology, especially in the study of reflexes. It is by means of these reflexes that an accurate diagnosis could be made and proper treatment instituted.

Babinski's clinic is held every Monday morning and is largely attended. He examines patients every day in his clinic, some are seen in the clinic proper and others at the bedside. There is an excellent x ray department in connection with it and an orthopedic department under Dr. Bidou, who is one of the most ingenious men I have met. The various appliances he has made are of great value in many cases of hemiplegia, as well as other conditions. There is a department of mechanotherapy and electrotherapy under the direction of Dr. Babinski, as well as a pathological laboratory, which contributes materially to the accurate studying of diseases.

The study of pupillary reflexes, their abolition in relation to syphilis, was made in collaboration with A. Charpentier in 1899 before the Society of Dermatology. In 1915 Babinski published in the *Revue Neurologique* an article on Reflexes of Defense, which is very valuable. He has written more than two hundred articles covering various conditions, including tabes, pseudopellagra, hysteria, hysterical paralysis, epilepsy, hemiplegia, meningitis, radiotherapy of spinal affections, diseases of the cerebellum and affections of the endocrine glands. Babinski's researches in hysteria are well known. He has written a great deal on this subject, which covers a vast amount of data. I have on several occasions seen him examine a patient for hysteria, making a diagnosis almost instantly, in a simple but remarkable way.

Dr. Babinski is a charter member of the Society of Neurology and of the Society of Biology; a member of the Academy of Medicine; corresponding member of the Royal Medical Society of London, honorary doctor of the Faculty of Medicine of Livow (Poland), honorary member of the Society of Medicine of Warsaw. He is also commander of the Legion of Honor and has received many other honorary degrees and titles.

41 Avenue Kléber.

Book Reviews

UROLOGICAL SURGERY.

Traité d'urologie. Par G. Marion, Professeur agrégé a la faculté de medecine de Paris; chirurgien du service civiale Hôpital Lariboisière). Avec 418 figures et fifteen planches hors texte en couleurs. Paris: Masson et Cie, 1921. Pp. xx-572.

To those who are fortunate enough to read French easily, these two volumes by Professor Marion should be classed with the gift books, for they certainly offer the reader a pleasant surprise in surgical literature. They are written in the clear and limpid style which characterizes Marion's other works, they are freely illustrated, many of the drawings being new, and they cover the subject of urology in all of its phases.

The kidney is taken up first and the respective parts of the urinary tract follow in order down to the urethra, in both sexes. The author's views on the surgery of the urinary tract are too well known to require explanation, and the present volumes reflect these views. The result is a work that can be read and followed with the feeling that the author has kept nothing from his readers that they ought to know. The teachings are conservative and up to date in every respect, even to the chapter on Urologic Formulas, in which a series of useful and interesting remedies for the urologic tract is given in various combinations. Primary consideration is given to the subject of diagnosis and exploration, while the subject of pathology receives considerable attention.

It may be said, without hesitation, that these volumes represent the last word on contemporary French urology, and constitute a fitting complement to the author's well known volumes on *Cystoscopy and Ureteral Catheterization.* Typographically they are all that could be desired, the paper being of high quality, the printing good, and both standing out in striking contrast with the rather cheap volumes being turned out by German medical publishers at the present day. Marion's work can be recommended to all readers of French who are interested in urology from its surgical aspects.

STUPORS.

Benign Stupors. A Study of a New Manic Depressive Reaction Type. By August Hoch, M. D., Late Director of the Psychiatric Institute of the New York State Hospitals, Ward's Island; Late Professor of Psychiatry, Cornell University Medical College, New York. New York: The Macmillan Company, 1921. Pp. xi-284.

The final message of this active observer in the field of psychiatry is significant. He has presented material productive in stimulus for research in the functional dynamic form of interpretation of psychic phenomena. He rejects those types of rigid classification which leave groups of phenomena isolated without any explanation of their relation to the personality in which for some reason they have appeared. He merely separates, for the purposes of his study, the benign stupors from the more malignant types of stupors, but not for one moment does he neglect their relation or the more clearly recognized symptoms which reveal these as belonging to certain more definite disease pictures.

Yet Hoch shows that there is sufficient consistency in the manifestations of these benign stupors to make them of fruitful interest for a special group study. They reveal the personal variations that must always be taken into account and which are of greatest importance in understanding the functional significance of the manifestations to the interests of the personality. These naturally have to be defined in terms of the unconscious cravings. Hoch has given them a suggestive explanation from this point of view, even while he has left the field open for still more exact research for such interpretation. At the same time he has not neglected the external aspects of the intellectual impairment and the behavioristic picture observable during the existence of the stuporous condition. The book, left unfinished, has been edited by a sympathetic coworker in the field of psychiatric interpretation.

ELECTRICITY IN MEDICAL PRACTICE.

Medical Electricity for Students. By A. R. I. Browne, Member of the Chartered Society of Massage and Medical Gymnastics; Teacher of Medical Electricity at the Western Infirmary, Glasgow. The Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton, 1921. Pp. xv-231.

Leitfaden der Elektromedizin. Für Arzte und Elektrotechniker. Von Dr. med. August Laqueur, Leitender Arzt des physikalisch-therapeutischen Instituts am Stadt. Rudolph Virchow-Krankenhaus in Berlin. Dr. phil. Otto Muller, Ord. dozent für Elektrotechnik am Friedrichs-Polytechnikum Coethen, dozent für die Technik der Elektromedizin am der Universitat Halle. Dr. phil. nat. Wilhelm Nixdorf, Weil, Oberingenieur und dozent für Elektrotechnik. Mit 133 abbildungen im Text. Halle an der Saale: Carl Marhold, Verlagsbuchhandlung, 1922. Pp. 243.

The average physician knows so little about the application of electricity to medical practice that such books as these under review should be seriously accepted, not only by students about to pass their examination, but also by graduates in medicine. In the English volume the author has attempted to confine himself to the subject as required for the examinations of the Chartered Society, but he has nevertheless given the reader considerable information of a most useful kind for the practitioner of medicine, especially in that branch which has become known as reconstruction work.

High frequency and diathermy have been lightly touched upon, and the reader is referred to special works on these subjects. The same applies to the subject of röntgen rays. These omissions weaken the work from the viewpoint of the practicing physician, but the author believes that the student does not require fuller details of these subjects. The work is divided into three parts, electricity and magnetism, medical apparatus, and electrical treatment, each part rather freely illustrated. Under the last heading, radiant heat and light, ionic medication and electric baths are fully described.

Within its conceded limitations this little volume will be found a most useful addition to the student's library; a careful study of this subject will be of considerable value to him in his professional life, whether as a practitioner of medicine, or as a professional masseur. The book is well printed and bound in the uniform style of the Oxford Medical Publications.

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In *Leitfaden der Elektromedizin* the authors cover practically the same ground, though as was to be expected from the title of the book it is adapted to the requirements of the practicing physician rather than of the student of electrotherapeutics. With characteristic Teutonic thoroughness, the authors have gone deeply into the physical aspects of electricity, and have devoted their attention largely to the therapeutic aspect of the subject. The preface, which begins with a quotation from Goethe (1825), tells us that the physician Scribonius Largo, in the time of the Roman Emperor Claudius, used electricity for the cure of headache, the electric current having been obtained through the use of the living "Torpedo marmorata" which gave forth a considerable electric current. Children's cramps and rheumatic pains were likewise treated by this live electric current, apparently successfully. Modern electrotherapeutic methods are taken up and treated quite fully, particularly diathermy and high frequency. The authors have collaborated to produce an excellent working manual for those who are interested in this branch of therapeutics.

TUBERCULOSIS.

The Relation of Tuberculosis to General Bodily Conditions and to Other Diseases. By F. Parkes Weber, M.A., M.D., F.R.C.P., Physician to the German Hospital, London; Formerly Physician to the Mount Vernon Hospital for Chest Diseases. London: H. K. Lewis & Co., Ltd., 1921. Pp. 27.

Lessons on Tuberculosis and Consumption for the Household. Showing How to Prevent Tuberculosis, How to Recognize Its First Symptoms, How to Win Back Health. By Charles E. Atkinson, M.D., Recently Medical Director of the Seymour Sanatorium for Diseases of the Throat and Lungs, Banning, Cal.; Formerly Member of the Resident Medical Staff of the Pottenger Sanatorium, Monrovia, Cal. Illustrated. New York and London: Funk & Wagnalls Company, 1922. Pp. 470.

Weber's book is the first Mitchell Lecture on Tuberculosis delivered before the Royal College of Physicians, London, and represents an admirable survey of the present condition of the tuberculosis problem. It is a masterly description of the routes of entry of the tubercle bacillus, the problem of immunity, and the influence of diabetes, syphilis, hepatic cirrhosis, Hodgkin's disease, heart disease, gout, pleurisy and pneumonia. A striking statement in the first chapter is the one used before by Sir Robert Philip, "Tuberculosis is a vicious byproduct of an incomplete and ill informed civilization," to which Weber adds, "It is so widely spread in the civilized communities of the world that it would be far more reasonable to try to segregate those individuals who have escaped infection than those who have been infected." Concerning the routes of entry, the author sides with the view that the bovine type of bacillus is the far most common cause of tuberculosis of lymphatic glands in children, but then he says that Calmette, however, points out that human tuberculosis is common in some countries where bovine tuberculosis is absent. He thinks that temporary conditions or primary or secondary tuberculous bacillemia (the typhobacillosis of Landouzy, Leon Bernard, Armand-Delille, etc.) are much more common than is generally supposed—that these cases are often passed by as febrile attacks of unknown origin. Weber does not believe that Hodgkin's disease (lymphogranulomatosis maligna) is intimately—and perhaps casually—allied to tuberculosis. He does not think that the obtainable clinical and pathological evidence and the ordinary experience of hospital physicians point to much real relationship between the two diseases. He admits with others that acute pulmonary tuberculosis is seldom found in gouty subjects or associated with true glandular kidney. As a whole, the lecture is an admirable exposition of the subjects mentioned. While the lecture itself covers nineteen closely printed pages, a highly interesting bibliography on the various subjects of eight pages has been taken from the medical literature of the world.

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The lengthy title of Atkinson's book is followed by a preface of four pages, then a leaf bearing on one side the words Lessons on Tuberculosis and Consumption and on the next page the words Note Concerning the Scope of This Book. The outside cover gives the title twice, Lessons on Tuberculosis and Consumption, and in red letters the words A Powerful Household Weapon for Fighting the White Plague—To the Sufferer and to the Seeker of Prevention.

The book has some interesting illustrations, some appropriate and some, particularly the first one showing children playing in the sand, having hardly any bearing on tuberculosis. The book is interestingly written, but is too long and too effusive. Objection might be raised to the views expressed in the chapter on Rest and Exercise wherein the author says: "Rest for repair is needed mainly in the first half of the treatment, exercise for endurance will probably be required later." He then recommends rest only when fever is present and the disease progressing. There are many afebrile cases in which rest is needed just as much as in the febrile cases, and only the physician watching over the case can decide this. Not once in this important chapter on Rest and Exercise does the author mention the necessity of following the physician's advice and not the patient's subjective symptoms. Many good and readable points are brought out in the other chapters.

One could hardly expect a healthy layman to wade through a book of well nigh five hundred pages for his education in the prevention of tuberculosis. To make in the very title a difference between tuberculosis and consumption is unfortunate. The word tuberculosis is now so much used and the word consumption so little used that the word consumption need not to have been used for a popular essay. After noting that the book is altogether too voluminous to be useful in popular propaganda, we may say in conclusion that if its many interesting chapters could be condensed to half their size and their somewhat peculiar titles be omitted, as, for example, If the Chest Had a Window, When Blue Days Come, etc., the book would prove a valuable aid in the crusade against tuberculosis.

HOSPITAL ACTIVITIES.

Hospital of The Protestant Episcopal Church in Philadelphia. Medical and Surgical Reports of the Episcopal Hospital. Volume V. Philadelphia: William J. Dornan, 1921. Pp. vii-506.

This volume of over five hundred closely printed pages, made possible by the establishment of a publication fund by a generous friend of the hospital, is the first to be issued since 1916, owing to the interruption of the great war. Approximately sixty separate articles represent the contributions of members of the medical and surgical staffs of the institution. The volume is well printed, and copiously illustrated. The surgeon will find this volume interesting, particularly the articles from the pen of Dr. A. P. C. Ashhurst.

PSYCHOLOGY OF EMOTIONS.

The Psychology of Thought and Feeling. A Conservative Interpretation of Results in Modern Psychology. By Charles Platt, B. S., Ph. D., M. D., F. C. S. (Lond.). New York: Dodd, Mead & Co., 1921. Pp. x-290.

This book represents an unmistakable advance upon the former attitude of psychological thought. It reveals a writer who can evaluate psychic phenomena from the viewpoint of their functional interrelationship and their relationship to the personality in which they have place. There is recognition of psychic activity in more than one sphere, that is, an activity to be taken into consideration below as well as above the threshold of consciousness. There is appreciation of individual psychology, as well as social psychological problems from such an enlarged point of view. There is a simple but satisfactory discussion on a scientific basis to explain psychic phenomena often supernaturally interpreted. Particularly commendable, in view of some of the narrowly selfprotective statements current in the daily press, is this writer's saner view of the problem of the criminal.

Yet with all that is encouragingly broad in its sympathy with that larger active life, the whole complex psychic activity of man, there is blindness still to many interrelations. There is still some refuge taken in the merely descriptive, and one believes that, in spite of the writer's attempt to take a broader attitude toward the functioning nature of the psychic life, he fails to grasp one cardinal fact. It is that essential dynamism of the psychic life which Freud has at least made clearer to us by defining it in two great divisions of instinct, one of which especially pours itself out into various expressions of the psychic life. The writer, like so many others, fails to grasp this larger dynamic meaning of the sexual. He is confused by the fact that, because of its dynamic force and the aspects in which this displays itself, Freud continues to call it the sexual. A grasp of this would have led the author into an acceptance of repression or the hindrance to this force which would have given him a profounder explanation for the disturbances which he reviews as well as for the entire activity of the psychic life. Some of these he has at least suggestively approached. One could wish that so great an advance in the direction of a truly genetic interpretation of the mental life could be cleared of the misleading half truths with which the author's writing is still somewhat encumbered.

ANATOMY OF NERVOUS SYSTEM.

The Anatomy of the Nervous System. From the Standpoint of Development and Function. By Stephen Walter Ranson, M. D., Ph. D., Professor of Anatomy in Northwestern University Medical School, Chicago. With 260 Illustrations, Some of Them in Colors. Philadelphia and London: W. B. Saunders Company, 1920. Pp. 395.

The use of this well compiled anatomy of the nervous system ought to convince the most mutinous student that textbooks or other technical guides are not merely a necessary evil. It is fitted rather to enlist his interest in neurology as a science related to developing functional organisms. Its pages of discussion and its many clear illustrations give him points of entrance into the life story which the author has here unfolded. It is a clear, exact work of science presented in the dynamic setting of the history of evolution which culminates, or, rather, still proceeds through the highly organized nervous system of man.

Brevity and compactness are merits of the book with a striking vividness in manner of presentation whether in text or in illustration. These characteristics are enhanced by the form in which the publishers have presented the book. The brevity of treatment does not make for dogmatism. Rather the way is everywhere left open for further consideration of disputed points or for comparative study, so that the book stands as much for incentive to investigation as it does for statement of accepted fact. Its practical value is furthered by a suggestive outline for laboratory work on the part of the student. It is a convenient and stimulating book for reference for the neurologist of any grade of experience.

LAWS OF SEX.

The Laws of Sex. By Edith Houghton Hooker. Boston: Richard G. Badger, 1921. Pp. 373.

It is to be regretted that a book containing so much that is sound should also present statements which are so immature. The survey presenting existing conditions is excellent and the information is of value. The attitude toward sex *per se* is wholesome, scientific. The most modern views on sexuality have been presented. But when we come to a solution of existing conditions . . . We are told that laws should be enacted for this and for that, long lists of laws are preposed which we are told would cure any and all existing evils. We are also informed that we need not worry about the enforcement of these laws, as when women will become completely emancipated they will surely enforce the law impartially for men and women alike. Crime or vice have never been conquered by law. How much longer will we have social workers naively repeat these absurdities to us? They have the faculty of compiling a few facts and then with hammer and tongs and laws blandly proceed to save the world.

Venereal prophylaxis is handled in a rather roundabout way. Statistics are used which the author herself should recognize as worthless and then she comes out flatly against prophylaxis, using the stale, puritanical argument that it would augment sexual intercourse. First, we are shown an awful picture which leads us to believe that illicit intercourse is universal and that any deviation from this concept would be abnormal; then in the same breath that it would be increased. As if when people knew there was a treatment for malaria or syphilis there would be an increase in the number of infections.

When will we learn that education and not laws are necessary to combat evil? When can we hope to have the social worker grasp this point of view?

CASE HISTORIES.

Outlines for Case Taking and Routine Ward and Laboratory Work. As Used in the Medical Clinic of the Washington University. By George Dock, A. M., M. D., Sc. D., Professor of Medicine, Washington University, St. Louis, Mo. Third Edition, Revised. Ann Arbor: George Wahr, 1921. Pp. 54.

This little pocket brochure of fifty-four pages reaches its third edition, presumably in response to a demand for such a book. It is intended primarily for the medical intern, based originally on Strumpell's *Leitfaden,* as an aid in obtaining uniformity and completeness in taking patient's histories. Being intended merely as an outline, methods have not been included; likewise laboratory manipulations, which can be consulted freely in the handbooks which are available in every hospital's laboratory.

The author presupposes a knowledge on the part of the intern, of the foundation of physical diagnosis, a certain facility in elementary laboratory technic and a general knowledge of internal disease. With this general knowledge, and a careful application to the suggestions conveyed in this little work, the intern will find little difficulty in getting a complete history of the case and his charts will give a systematic picture of the medical and historical findings.

THE DREAM DOCTOR.

A Third of Life. By Perriton Maxwell. Boston: Small, Maynard & Co., 1921. Pp. 304.

A phantasy, reminiscent of childhood, when one planned one's future in the rosiest of flashes as one waited to fall asleep. By a study of dreams, a physician accomplishes many remarkable cures, feats of the nature of spirit communication, solves legal tangles, and wins the hieress's love and respect. The methods of dream interpretation are not strictly Freudian.

The factor of wishfulfillment is recognized and the medico's individual discoveries of the fruit of Freud's labors are largely based upon this theme. Provided no reader takes it seriously, the novel may prove entertaining. It belongs to the type of mystery story brought up to date by the latest touches in soul surgery as conceived of by the lay mind.

JEWISH FAIRY TALES.

The Jewish Fairy Book. Translated and Adapted by Gerald Friedlander. With Eight Illustrations in Color by George W. Hood. New York: Frederick A. Stokes Company, 1920. Pp. 188.

The wishfulfillment that marks the creation of fairy tales fairly blazons itself forth in this collection. Phantasy atones for inferiorities of all sorts by elaborations in magnificent form, often in more piously restrained though not less marvelous situations.

These inferiorities lie perhaps in national experience, perhaps only in the sense of individual inadequacy toward the many demands of reality. It is easy to discern that excess of symbolism characteristic of the orient by which sexual greatness is enhanced or other unconscious desires are granted magic satisfaction. One finds this in the Aladdin-like carpet which grants magnificent although puerile satisfactions to the great Solomon. The unconscious reveals itself in the tale which permits the pious poor man to obtain from the worldly rich man all his wealth in the form of valuable pearls obtained through the fish which has swallowed them. The tales are hardly subtle in their granting of wish fulfilments. A great deal of religious rationalism, while it forms an interesting comment upon the racial secondary elaboration, also somewhat obscures the more universal expression which the stories should otherwise contain.

POSTWAR COMPLICATIONS.

The China Shop. By G. B. Stern. New York: Alfred A. Knopf, 1921. Pp. 286.

The wand of the true artist has been waved over a group of incongruously related characters, and has made them live. The currents and cross currents within the family and its widely branching associations wash on to their allotted end with the inevitableness usually granted to Providence, but here clearly understood to be personality reacting upon personality and environment. It is a gripping study, a real novel; a story the like of which has not been seen in many a long day. Chief among the conflicts is that between the teller of the tale, Kevin Somers, and the son of the man who nearly became his stepfather. Brothers they are in interests and at heart, without the repression of actual blood relationship. Environment throws them into one human crisis after another and the tangled skein of human emotions and consequent behavior is keenly understood and presented in a truly enlightened manner. Imperceptibly Somers struggles out of his infantile state of inferiority, realizes himself as an individual, stands upon his own feet and bids his shadow self begone. For the sake of the story this only occurred with the death of the rival. But we hope for the sake of the friends made in the reading of the book that the cure would have taken place any way.

GERMAN FAMILY LIFE.

Envy: A Tale. By Ernst von Wildenbruch. Authorized Translation by Elsie Traut. Boston: The Four Seas Company, 1921. Pp. 144.

A tale of the conflict between two brothers which is accentuated by a domineering German father who has little insight into the home life surrounding him. The younger, weaker brother, dies and the older one feels that the guilt of death is his. The brother rivalry was fanned to hatred by the father. The go between mother could not neutralize the conflict. So the brother, now an old man, blames the ills of the world upon what he considers his own weakness. He seeks to atone by the building of a church and is ever trying to expiate his socalled sin. In a less marked way this conflict is an ever present one and should be better understood in order that many similar unhappy situations be avoided.

Practical Therapeutics

PRINCIPIA THERAPEUTICA.*

By Clarence Bartlett, M. D.,
Philadelphia,
Professor of Medicine in the Hahnemann Medical College of Philadelphia.

The principal duty of the physician is to heal the sick and relieve human suffering. In other words, he is expected to practise the art of healing. He is to be more than a mere scientist. Very much, possibly too much, has been said concerning the paramount importance of diagnosis, laboratory work and research. I take the ground that while diagnosis and modern medical science should not be by any means belittled, nevertheless an examination that stops short of suggesting measures for securing a return of health, or at least of alleviating suffering, falls far behind the ideals of the true physician.

Permit me to interpolate at this point a matter which I am sure will appeal to all of you. I have said above that diagnosis is of the greatest importance, but that it should not be made the ultimatum in practice. Very frequently we are called upon to treat a patient very early in the course of the disease, when the symptoms and functional disturbances lack diagnostic features, and as a result we are unable to make a diagnosis. To delay treatment until the nature of the illness is settled would seem to be an act of folly. We all of us recognize this in practice in that we proceed to apply treatment adapted to patients' symptoms and functional disturbances upon which such symptoms depend. Not infrequently, perhaps it would be better to say in a remarkably large percentage of instances there follows a recovery as the result of our ministrations and the case really remains undiagnosed, so far as assigning to it an official diagnostic label. That such cases are common is to the credit of the medical profession.

What furthermore is to be deplored are the occasional remarks of physicians of high standing made carelessly in reference to the inadequacy of therapeutic methods. Such remarks have had a bad influence upon us by producing unnecessary pessimism, which in some quarters at least, has appeared to be in direct ratio to the honesty and scientific attainments of the maker thereof. The unfortunate impression has thus gone out to the laity that the medical profession aside from the surgeons and the specialists are therapeutic nihilists, and our friends and patrons have in many instances given themselves over to the care of practitioners of the many types of mechanical therapy. Because of these thoughts that came to mind I selected as my subject principia therapeutica.

At the outset permit me to ask, is our reputation as therapeutic nihilists deserved? and to answer, most decidedly "No, it is not." There comes a time in the life of all, when the physician must lose in the battle against disease; and unfortunately, it is this one time that counts against us despite the great amount of good we have done in the past. How many of us at autopsy have noted lesions so extensive as to cause us to marvel that the patient had lived as long as he had; cancerous tumors involving an entire thorax, and even deforming the bony walls; mitral valves so stenosed as to be all but closed; aortic valves exuberant with vegetations; myocardiums so degenerated as to make us doubt that they had ever had any muscular action! Indeed I might well recount numerous such experiences well within the knowledge of all of us; and equally well might I condemn the attitude of the pathological scientist who does not hesitate to make a contemptuous reference to the medical man "who tried to cure that," when, as a matter of fact, the medical man who had maintained life until there had arrived a period of advanced pathology, deserved the highest praise imaginable. For every autopsy showing that the patient's life may have been prolonged, there are a score or more that speak for medical triumph. I trust that the time will not be far off when we shall cease hearing spoken in tones of selfsatisfaction, "I do not believe in treatment."

Permit me now to review as far as time will permit, the ways and means by which we shall place ourselves on the right track. The first thing, the last thing, and the whole thing, is the determination to do quality work relegating the quantity workers to the background. The public will not stand for it is the reply. They are too accustomed to prescriptions dispensed or written hurriedly, the very speed of the work standing to them as a testimonial of the prescriber's rapidity of thought and action rather than as evidences of carelessness in medical technic. A medical examination which shall include a thorough analysis of the case from a therapeutic viewpoint is necessary and takes time, and when the public once has the opportunity of observing what stands for strict quality as opposed to speed and quantity practice, they not only will stand for it, but they will demand it. The public is a fool only part of the time. When there is a serious illness at hand, the patient becomes thoroughly interested in all the details, so that while the physician is examining the patient, the patient is examining the medical examiner. Not only does he study the physician's personality, his methods as to system, his facial expression, but he virtually studies the entire man, even more thoroughly, I am afraid, than we study the patient as a whole.

Successful therapy demands in addition to the scientific, certain qualities, namely, idealism and optimism. These may be difficult to attain and keep at the proper level. It is easy to preserve our ideals which can never be placed too high; unfortunately, however, if we are temperamentally so constituted that disappointment following a failure to attain the ideal discourages, then an unhealthy state of mind—pessimism—enters, and becomes a difficult problem. Optimism is an absolute necessity, and is not unjustifiable in view of the predominance of our successes over our failures. Even with the worst of the latter, we are usually obliged to admit, despite rigid selfcriticism, that we have done much to bring the patient relief. Let idealism, optimism and criticism be well balanced in therapeutics and careful study will take care of the rest. Under no circumstances must we attempt to do the impossible, otherwise we may readily lose the opportunity of accomplishing that which is possible. In other words, at the outset, let us examine our patient carefully to determine what is curable in his case in particular, and with our knowledge of what is curable in disease in general we are readily guided to accurate prognoses.

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*Read before the West Philadelphia Medical Association, March 22, 1921.

I have often heard it said that the proper practice of therapeutics requires imagination. When this remark was first made to me, I resented it as frivolous and unscientific. As time wore on, the statement appealed to me as one of remarkable truth that should never be forgotten. If we but stop to think, we recognize that virtually all of the great men of the world were men of imagination, incentive, ingenuity and initiative. Too close an adherence to precedents is not always wise.

Our difficulties in both therapeutics and diagnosis are at times created by the apprehensions and the ignorance of the friends of our patients. Failure to recognize this fact may readily lead us into error. For example, within a few days I was invited to see a patient with typhoid fever in consultation with a fellow practitioner. The patient was doing well; indeed she hardly seemed to be sick. The family physician was rather puzzled over the request for a consultation (which I must admit appeared to be absurd) but had readily granted it. Conversation with the nurse in charge discovered that a relative having died of cancer, a dutiful daughter had conjured up the fear that her mother might be in danger of that dread disease. This suggested to me the necessity for considering the carcinomatous factor as a possibility, although to the minds of myself and my colleague ths proposition was, as I have said, absurd. The examination was necessarily conducted on complete lines following the system of the strict diagnostic ritual. Every examination should be directed to the discovery of the patient's own fears or thoughts concerning his illness. This may bring information not otherwise obtainable. It may even discover complicating conditions created entirely by the patient or his family, the removal of which is followed by prompt recovery. I have often listened to a history remarkable for its length and its lack of point. Finally when desperation demands the question, "Of what do you wish to be relieved in order to have good health?" the answer often serves to solve the mystery.

Knowledge should always be obtained concerning our patient's environment. Often the sufferer is not sick at all; he is merely the victim of the temperamental peculiarity of a member of his household or of someone with whom he may happen to be associated in his professional or business affairs.

Failure is sometimes the result of lack of time in explaining details to the patients. Notwithstanding that we know it well in theory, about half of us really realize that people do not know as much as we do. We must take nothing for granted. Vague terms like rest, diet, and soft diet, are altogether too indefinite to be of real value. Sometimes in order to secure confidence and obedience, it is necessary to make explanations as to the why and wherefore. In other words, it is necessary to educate our patients as to carrying out details. We must inform them exactly as to difficulties to be surmounted. Time expended in this way is seldom wasted. Furthermore the process of educating patients is a self-education, the importance of which is not to be underestimated. Some patients are not educable; some are controversial or argumentative, and even puerile.. What to do with many of these people passes human comprehension. Most of them are imaginary invalids and ultimately take over one or more of the many new cults.

Let us remember that knowledge of the patient is as necessary as knowledge of his disease. To state the matter squarely, I would say that I myself would much prefer a physician who knew me thoroughly and my disease less so, than one who knew the disease thoroughly, and myself not at all. The sooner the public gets away from the idea of specialism for everything, and encourages the development of the general practitioner (who by the way should have the gumption to announce himself as a real specialist) the better it will be for the health of the community and the efficiency of the human race.

After this rather generous introduction, permit me to take up for your consideration the first axiom in the management of disease. It has been tersely expressed in the Latin *non nocere,* do no harm. Absurd you say, physicians never do harm. Of their own volition they do not, but demands of a badly educated public often lead to the adherence to fads and fashions in therapeutics, which we in our sane moments would not countenance. May I recount the present day craze for tooth extraction and removal of tonsils, not that these measures are useless, but resort to them is altogether too common. May I mention the dietetic fads leading to the exclusion of the necessary vitamines from the patient's food with the natural production of one of the deprivation diseases? May I recall to your mind the many cases of therapeutic starvation produced by some colleague, and which you have cured by no more complicated procedure than a generous mixed diet?

Several years ago there came to me a man who had traveled over two hundred miles to consult me because of an alleged diabetes. His general condition was excellent. It was difficult to pick a flaw in it. He did not have a symptom or discomfort other than a slight urinary irritation for which he had been taking medicine. His urine contained a copper reducing substance and he had been on an antidiabetic diet. To determine his *status præsens* he was ordered a generous mixed diet for a period of three days and to take no medicine. When he reported again his urine was absolutely normal. Further investigation discovered that he had been taking hexamethylenamine. Unnecessary to state he was advised to go home and not to worry; that he was a healthy man.

It is well known that there is such a thing as drug idiosyncrasies. We all of us know of patients in whose case potassium iodide produces coryza; sodium salicylate, tinnitus, deafness and vertigo; quinine, general erythema, urticaria and amblyopia; and atropine, cerebral manifestations, visual disturbances and dryness of mucous membranes. Individuals differ greatly respecting their susceptibility to special drugs. The weight of the patient does not always afford an adequate explanation; for example, I have a patient weighing but 90 pounds, who can take 1/200 gr. of atropine three times daily indefinitely without discomfort, while another patient, a man weighing over 250 pounds, cannot tolerate 1/400 gr. longer than twenty-four hours.

The dictum *non nocere* applies to more than drugs. It applies to all our special directions or instructions. Infractions of it usually result from insufficient examinations; for example, what would you think of the physician who advised outdoor exercise in the form of walking, only to discover later that his patient happened to be a letter carrier?

Non nocere demands investigation into minutiæ. It demands less serious attention to new ideas of rather radical character, as for example, the present day craze concerning acidosis, leading to unwarranted doses of soda bicarbonate and the elimination from the diet of many useful foods, alleged to contain too much acid. Here permit me to remind you of a piece of information that came to me as a gross surprise, in fact I call it a rude shock, and what is worse it came from an undergraduate medical student, to wit, spinach contains more acid than tomatoes, by four to one, and yet for years we physicians have been pushing in the spinach and forbidding the tomatoes, and have spread forth a fallacy which will require years to eradicate.

A mistake frequently made and one that is capable of doing much harm, is that of prescribing or dispensing medicines in quantities greater than the exigencies of the case demand. This remark is made entirely apart from the question of economics. Permit me to illustrate: a certain eminent physician desired to use calomel as a diuretic. Notwithstanding the fact that the period of time which this drug should be administered is limited, he ordered a quantity far in excess of the proper period. The patient made a good recovery and returned to business. The physician later went away on his summer vacation. The patient's wife, being of a frugal turn of mind, had carefully put aside the calomel powders for future use. Subsequently there was a relapse. In the absence of the physician the wife constituted herself the medical adviser and started in with the calomel once more. Needless to say, there resulted a ptyalism of a serious character and it was not until all the medicine had been taken that a physician was brought into the case. Of course complications occasioned by such a practice lead to prolonged illnesses.

A corollary of *non nocere* may be expressed in the vernacular of the day, "play safe when in doubt." An excellent illustration comes to mind. You know that the early days of typhoid fever are characterized by an indefiniteness of symptoms which makes a positive opinion impossible, even with the best of diagnosticians. You know that the majority of symptomless fevers without local signs to explain the pyrexia turn out to be typhoid. In the midst of such a state of doubt, the proper procedure is to enforce rest in bed and nursing, and dietetic restrictions proper to the management of typhoid fever. Should the case turn out to be typhoid, we have acted wisely in that good treatment has been instituted early; if it turns out to be otherwise, then we have done no harm.

The second dictum presented for your consideration is *tolle causam.* Remove the cause. This is too self-evident, you say. But is that so? This very morning there appeared before me for a thorough physical examination, and an opinion concerning his heart, a young man of twenty-eight who had been turned down by an insurance company because of rapid heart action and a leaky aortic valve, at least that was his story. The general practitioner whom he consulted could find nothing wrong and referred him to me for additional advice. Aside from a pulse ranging from 84 to 96 during the progress of the examination, that patient was as healthy a one as ever came to me. The existence of the tachycardia at all times was unquestioned. Now for the dénouement—this young man was drinking three cups of coffee and from six to eight cups of tea daily. Otherwise his habits were good. Many years ago there came to me from Tennessee a typical Southern gentleman, who desired to be cured of his sciatica. My examination failed to discover a cause. As he was leaving, he remarked that he was very desirous of meeting a certain Mr. B. who enjoyed a country wide reputation as a great student of geology and the possession of the finest private collection of minerals in the United States. By one of those happy circumstances that occur altogether too seldom, Mr. B. passed by on the other side of the street and my patient ran after him and accosted him. Amused at the incident I watched and then and there discovered the cause of my patient's sciatica. He had invented a cane, apparently a straight stick, but so constructed that by a joint one third of the way down from its handle end he could convert it into a T. He used this cane by sitting on the cross piece while he was talking. It was the pressure of that cross piece that caused his sciatica!

Investigation does not always bring forth the truth from the patient. The excessive tea drinker tells us that she always takes it so weak that it is scarcely more than hot water. I am inclined to think that she believes it. Let us take this question of tea drinking as a cause of disease. The annual consumption of tea in the United States is sufficient to give every man, woman and child one and a half pounds of tea a year. A vast number of people do not take tea at all. Infants and children are not permitted to indulge, therefore we are safe in assuming that the average consumption of tea by the tea users themselves is very large indeed. So far as I can learn one pound of tea will make at least 200 cups of the beverage. A number of years ago I was called upon to examine a young woman upon whom it was proposed to perform an oophorectomy for the cure of certain serious nervous manifestations. Inquiry showed that she was drinking from twelve to fifteen cups of tea daily. The operation was never performed.

DIET.

Thirdly, I would place on the list of therapeutic questions that of diet. Up to the present time, dietetics cannot be said to have reached any degree of scientific precision. We know too little of physiological chemistry and of the chemical processes undergone by food in its assimilation by the body to make humanity a mere laboratory utensil for the conversion of food into tissues and bodily energy. Certain primitive rules covering diet should be our guide. Think as we may, we cannot escape the fact that the standard foods of value are limited in number in any given community. We cannot get away from the fact that it is essential that individuals must subsist upon a mixed diet, containing proteins, carbohydrates and hydrocarbons, the relative proportions of each varying according to the individual, his environment and his activities, knowing well that what is one man's meat is another man's poison. Therefore we cannot afford to be too dictatorial in dietetic restrictions. When we come to study the question, we find that dietetic errors usually consist not in the special articles taken, but in the consumption of inferior quality, of too great or too small quantity of food, improperly prepared, in a bad environment, eaten hurriedly, or at irregular intervals, often in the midst of great anxiety, without proper attention to a period of rest and relaxation for a period of a half an hour or so following a meal.

No one will dispute the importance of quality of food. However, when we come to the question of preparation of cooking we strike a matter of more than ordinary moment. Many a good meal has been spoiled in the cooking. And as to bread, what is turned out in many households may well defy the examination of expert chemists. With such stuff furnished at many tables, it is no wonder that we have socalled stomach trouble at every hand.

Environment, too, counts for much. In many a household the sound of the dinner bell is but a signal for the bringing together of the clans for battle. The best food must disagree under such circumstances. Have you ever noticed that at banquets where good fellowship prevails and the guests consume one course after another and every one is happy, notwithstanding the reputed indigestibility of the viands, the diners feel well the following day? Let us take this experience into the sickroom. The manner of serving food has an important influence upon the sick; a disorderly tray is almost certain to spoil the invalid's appetite. There are times when, after we have cured our patients, we find that we have starved them so completely as to require an additional week or so to bring back proper nutrition. In other words, the function of food is to nourish. It is our duty then to feed as generously as circumstances will permit. However, when patients are ill because of excesses in eating or are decidedly overweight, restriction as to food is strictly in order. Before undertaking a change in the patient's methods of eating, we must determine that such change is needed or that past habits have been bad. As a rule, simple inquiries in this direction do not yield accurate information. On the other hand, if the patient is instructed to prepare each day a complete list of foods taken, and the quantities and methods of preparation of each, we have a standard which in addition to eating habits gives a good line on the patient's tastes.

These general remarks concerning diet do not traverse special measures, and the use of special procedures in special diseases, such as typhoid fever among the acute illnesses, and gastric ulcer, diabetes, gout, and tuberculosis, among the chronic. I might here interpolate a general dietetic suggestion which applies to the majority of illnesses of short duration where the maintenance of nutrition is not a crying factor. It is that in cases of this class the indications are all for rest, and hence starvation methods should prevail.

DRUGS.

Lastly, I come to the question of drugs, a question concerning which differences arose that created the greatest medical schism of all times, that alienated your forefathers and mine, and which, until but a few years back, prevented any friendly intercourse between us. An ethical quarrel carried on with great bitterness over a matter which now makes us all smile, as to the proper method of administering drugs. Fortunately, this is now a thing of the past.

The fundamental factor relating to the prescription is to be found in an accurate or ideal materia medica which unfortunately has not been attained, and which is not likely of attainment within the lives of any of us. We can, however, comfort ourselves that conditions are improving every day. A new school has sprung up which, while excellent in its conception and its result, presumes, I fear, to go too far, in its demands that we take nothing whatever on faith. It insists upon the acceptance of nothing which has not been proven with mathematical certainty by modern research methods. When positive results are secured by such a system, we know, of course, that they are trustworthy. Then we cannot speak too highly in its praise. On the other hand, ideals are so difficult to obtain under existing circumstances and results at times so unreliable, when negative, as to deprive us of a great deal that is valuable.

Whether I strike a sympathetic ear or not I cannot say; but with all admiration for the modern medical scientist, I must confess that I would not like to forego the entire teachings of Biddle, Bartholow, Stille, Brunton, Wood, Ringer, Phillips, Hering, Farrington, Jahr, Boenninghausen and many others. These men cannot possibly have been all wrong. Were they alive today, they would doubtless view kindly the pharmacological research of their successors. Perhaps they would recognize their own weaknesses more readily than do we their old pupils.

As able as are the modern pharmacologists, as well trained as they are for scientific work of most technical character, I fear that they incline somewhat to an intolerance of the workers in the ranks of clinical medicine, an intolerance that is not justified by experiences of the past and present.

(*To be concluded.*)

Treatment of Blennorrheal Conjunctivitis.—F. A. Grafe (*Ohio State Medical Journal,* June, 1921) states that we must begin with prophylaxis at birth and that the solutions used for dropping into the newborn infant's eyes must be freshly prepared with sterile distilled water. The solution used may be either two per cent. silver nitrate or ten per cent. argyrol and the dropper should not be allowed to touch the surface under treatment. If in spite of preventive measures conjunctivitis does develop, the services of a trained nurse are imperative. The eyes must be irrigated every hour, day and night, with a two per cent. solution of boric acid to keep down the accumulation of secretions. Only warm solutions should be employed. Every twelve hours the physician himself should irrigate the conjunctival sac thoroughly with a solution of mercury oxycyanide 0.1 in distilled water 300.0. At the first appearance of iritis a one per cent. solution of atropine sulphate should be instilled, one drop at a time, at intervals sufficient to keep the pupils dilated. This prevents the formation of posterior synechia.

Treatment of Duodenal Obstruction.—Kellogg and Kellogg (*Annals of Surgery,* May, 1921) conclude as follows: 1. Chronic duodenal obstruction occurs more commonly than is realized and can often be diagnosed from the history and physical signs. 2. The most interesting articles dealing with this condition are by Robinson (1900), Conner (1906), Bloodgood (1907), and Codman (1908). 3. Experimentally, it has been shown that animals with an isolated duodenal loop die of a chemical rather than bacterial poisoning. 4. The obsturction may involve the first or second portions of the duodenum only, due to ulcer, or gastroptosis or adhesions. When the entire duodenum is involved, this is most frequently caused by compression between the vertebral column behind and the superior mesenteric artery in front, especially when there is traction in the direction of the pelvis from the drag of a distended and ptosed cecum and colon. 5. The physical signs of obstruction in the first portion are those of pyloric obstruction. When the second and third portions are involved it can often be made out by percussion and succussion. 6. X ray frequently fails to show duodenal obstruction, but may be rendered more effective if a special technic is used. 7. The symptoms are those of epigastric discomfort and toxic manifestations. With a competent pylorus, cramplike pains predominate, when incompetent, regurgitation of bile is frequent. Socalled bilious attacks are probably due to duodenal obstruction. 8. The symptoms are often suggestive of ulcer, gallbladder, or appendicular trouble, and in operating for these conditions with negative findings the duodenum should be carefully examined. 9. Medical treatment, consisting of abdominal support, nutritious diet and anticonstipation measures, is beneficial in the majority of cases. 10. Surgical treatment in obstruction of the first and second portions consists of freeing of adhesions, gastropexy or duodenoduodenostomy. In the third portion the procedure of choice is duodenojejunostomy. 11. Duodenojejunostomy is indicated in, a, vicious circle after gastroenterostomy; b, accompanying gastroenterostomy when the duodenum is obstructed; c, in obstruction of the third portion not responding to medical treatment. 12. The total number of duodenojejunostomies reported are fifty-eight. There has been no mortality. In the author's series thirty-six patients were completely relieved of very troublesome symptoms, four were markedly improved, and only one unimproved. 13. Duodenojejunostomy will save from invalidism a group of patients not amenable to other treatment and should be recognized as a definite procedure..

Hemorrhage from the Nonpregnant Uterus in the Absence of a Neoplasm.—W. A. Scott (*American Journal of Obstetrics and Gynecology,* November, 1921), from a review of the literature and histological study of ninety-two specimens from cases of hemorrhage, asserts that the histological findings in idiopathic uterine hemorrhage are not constant. In the majority of cases the uterus is enlarged, hard, and thick walled, and contains an excessive amount of elastic tissue—the result of subinvolution. In some instances, however, bleeding does occur from uteri which do not show the gross or microscopical findings of subinvolution. Furthermore, the histological picture of fibrosis may be present without any abnormal bleeding. The most constant finding in bleeding cases is glandular hyperplasia of the endometrium. This and the bleeding are probably due to a common factor, which is probably ovarian. Two methods of treatment yield satisfactory results, viz., surgery and the x rays or radium. Proper surgical treatment consists of a subtotal hysterectomy, after the possibility of cancer of the body of the uterus has been eliminated. A few of these patients recover after repeated curettage, but their number is so small that the treatment is not admissible. The x ray and radium are more and more coming into prominence, with almost a certainty of cure in every case, after preliminary curettage to exclude cancer.

Intravenous Injections of Stibenyl in Tubercular Leprosy.—R. G. Archibald (*Journal of Tropical Medicine and Hygiene,* November 1, 1921) reports the case of a Sudanese aged forty who had been suffering from nodular leprosy for four or five years. In view of the good results obtained from antimony in a previous case, administration of stibenyl, the sodium salt of paraacetylaminophenylstibinic acid, was tried. A sterile one per cent. solution in normal saline solution or water was given intravenously on alternate days, the doses being 0.1, 0.15, 0.2, 0.4, 0.5 and 0.6 gram. After a rest of fourteen days this course of injections was repeated. After the fourth course of treatment, when a total of 7.8 grams of the drug had been given, the patient showed considerable improvement, the lepromata on the trunk having practically disappeared and the face no longer presenting a leonine aspect. The furrows separating the lepromata on the face were not so prominent and many of the nodules had subsided. The nasal ulceration had almost healed, and the voice was no longer hoarse and raucous. Smears from the nasal mucosa and nodules showed what appeared to be degenerated coccal forms of lepra bacilli lying free and intracellularly, the few bacillary forms present being very granular. The results surpassed those obtained with sodium gynocardate, and further application of the treatment is recommended.

Novocaine in Surgical Operations.—H. S. Sharpe (*Canadian Medical Association Journal,* June, 1921) says that the advantages of novocaine are: less shock, painless operations, absence of postoperative emesis, dissection facilitated, comparatively bloodless operative field, elimination of dangers of general anaesthesia, and of fear of general anesthesia on the part of the patient; comfortable placing on the table is assured; postoperative backache is avoided; nourishment may be taken immediately after most operations, an important point in itself, and also indirectly by the forestalling of postoperative acidosis from starving; ileus less frequent; healing of wounds not interfered with; cultivation of careful handling on the part of the surgeon. The disadvantages are: In acute infections the infiltration is not desirable; nervous and apprehensive patients are poor subjects for its use and they, as well as children, should have a general anesthetic; discomfort of preparation of operative field where irritating antiseptics are used.

Fractional Analysis of Gastric Contents.—Julius Friedenwald and Zachariah R. Morgan (*Southern Medical Journal,* September, 1921) draw the following conclusions from a study of 210 cases in which fractional analyses were made:

1. By means of fractional analyses we can study the entire cycle of digestion both as to the secretory and motor activity of the stomach.

2. By complete aspirations at any period of digestion we can obtain definite information regarding the amount of secretion.

3. In duodenal ulcer the acidity is usually higher than in any other condition. There is a rapid prolonged rise followed frequently by a fall and a secondary rise, though there may be a continuous prolonged rise from the onset. The highest acidity appears frequently after an hour. Blood is at times found in the contents, which lends additional evidence as to the presence of ulcer. Rapid evacuation is characteristic of uncomplicated duodenal ulcer.

4. In gastric ulcer there is no typical curve of acidity though a fall followed by a secondary rise is frequent. Hyperacidity is usually present, though there may be a low acidity or a normal acidity, the highest acidity appearing after an hour in most cases. Blood is obtained at times in the gastric contents, which presents further evidence in favor of ulcer. There is usually delayed motility in gastric ulcer.

5. By means of fractional analyses the acidity in any period of the cycle of digestion in ulcer may be noted. The highest acidity frequently occurs after an hour and occasionally before, so that its appearance would be entirely overlooked should we rely entirely upon the hour extraction.

6. The effect of an ulcer cure upon the hyperacid secretion can be followed by means of fractional analysis. In but half the cases, however, is a decided reduction in acidity obtained even though clinical improvement may be noted indicating that the symptoms ordinarily attributed to the excess of acid are not necessarily due to this factor.

7. In pyloric stenosis there is usually a high acidity during the whole period of digestion with delayed motility. Food shreds are observed in the fasting state.

8. In most instances of gastric carcinoma one finds a typical achylia frequently with delayed motility and a rather high total acidity and with lactic acid and blood. The Wolff-Junghans test is positive; considerable amounts of albumin being present within three quarters of an hour; being markedly increased within an hour to an hour and a half.

9. Cases of chronic gastritis present the same characteristics as are usually observed in simple achylias. The total acidity is usually higher, however, and in addition mucus is obtained which is not frequently observed in simple achylia. The motility of the stomach is often delayed.

10. In gastric syphilis the curves of acidity are similar to those observed in cancer. The total acidity is high and there is a complete achylia; the stomach emptying itself rapidly.

11. Fractional analysis of the gastric secretion according to the Rehfuss method is extremely important in all cases of achylia gastrica, inasmuch as by means of this method one can easily differentiate the true achylias from the spurious forms. This differentiation is extremely important, inasmuch as many of the false achylias present a very high hydrochloric acid index, sometimes marked hyperacidity, and are in fact really cases of delayed hyperacidity. In the true achylias free hydrochloric acid is absent in every specimen; the total acidity is low and there is a marked hypermotility. In pernicious anemia one notes typical features of true achylia.

12. In nervous gastric affections one observes the various forms of hyperchlorhydria, hypochlorhydria or normal acidity. The hyperchlorhydrias present a rapid rise in acidity, 100 or over, with a normal motility. One frequently notes among these cases the socalled false achylias, with an absence of free hydrochloric acid at the end of an hour, yet presenting a hyperacidity before or after this period.

13. In gallbladder affections one observes a tendency to a lowered acidity and achylia, while in chronic appendicitis hyperacidity is usually observed.

14. While fractional analyses are of the greatest importance and usually present additional evidence in diagnosis, a study of our cases, together with the observations of Rehfuss, leads us to the conclusion that no pathognomonic curve exists which can be considered as absolutely distinctive of a gastric affection.

Chronic Nephritis with an Unusual Degree of Nitrogen Retention.—Edward Weiss and Vaughn C. Garner (*Journal of Laboratory and Clinical Medicine,* January, 1922) describe a fatal case of nephritis in a young man with no etiological factor discoverable in history or physical examination, so that it was felt that such an advanced degree of nephritis as he displayed might point to a congenital basis. After autopsy the pericardial effusion, liver, and muscle were analyzed for their urea content. They closely approximated the blood urea figure (304 mg.) of twelve hours before death, there being an approximately equal distribution in all the body tissues and fluids. The authors suggest that if urea is not responsible for the uremic symptoms, it at least serves in many cases as a valuable index to the poisonous substances that are responsible.

Postnatal Treatment of Congenital Syphilis.—G. B. Fleming (*Glasgow Medical Journal,* November, 1921) believes that the intravenous injection of arsenical compounds reinforced by mercury is the best postnatal method. The younger the patient, the greater is the likelihood of a cure. Although signs and symptoms disappear and the Wassermann reaction becomes negative immediately after the course of treatment is stopped, there is still a possibility of a positive Wassermann reaction being obtained at a later date, so the case should not be pronounced cured until a negative Wassermann has been obtained more than six months subsequent to the conclusion of treatment.

Treatment of Congenital Syphilis in Infants and Children.—Walter Reeve Ramsey (*Minnesota Medicine,* September, 1921) draws the following practical deductions from a large series of experiments: 1. Mercurial ointment, fifty per cent., is to be preferred to the less concentrated forms and need not be repeated oftener than twice weekly. 2. Calomel ointment is absorbed but less rapidly and to a less extent than the mercurial ointment and should therefore be given in a greater concentration. 3. The salicylate of mercury should be given hypodermically twice weekly. 4. Mercuric chloride by hypodermic injections continues to be eliminated for six to seven days; the fact that its administration often is followed by the appearance of albumin in the urine should exclude its use in children. 5. Calomel by mouth is readily absorbed and continues to be eliminated for a considerable time so that it is probably sufficient to give it at intervals of several days, thus avoiding diarrhea. 6. Gray powder is absorbed to a small degree and rather rapidly eliminated, so that large doses repeated daily would probably be necessary to maintain mercury in the circulation.

Diagnosis and Treatment of Neurosyphilis.—Lesley H. Spooner (*Boston Medical and Surgical Journal,* November 24, 1921) says that the persistent, careful intravenous administration of arsenical preparations in tabes and central nervous syphilis yields satisfactory results without danger to the patient, in a large percentage of cases. The improvement is symptomatic and is accompanied by corresponding changes in the reaction of the blood and spinal fluid. In those cases which have not yielded to the intravenous method the patients have shown improvement under the combined treatment. In many cases the disease appears arrested. Even in the favorable cases, persistence in treatment is necessary over a long period of years. The reaction to the intravenous administration is generally of little consequence; to the intraspinous it is more severe. This consists of pain in the back, legs and head. Headache like that resulting from spinal puncture alone, is likely to appear and recur when the head is raised. This is purely a mechanical affair, due to the disturbance of ventricular pressure and is self-limited, provided the patient remains flat in bed for twenty-four to forty-eight hours, or until all symptoms disappear. The administration of the arsenic is safe, so long as proper technic is followed and the patient's general condition observed with as great care as in other investigations.

The Effect of Treatment for Syphilis on Severe Anemias.—H. O. Foucar and John H. Stokes (*American Journal of the Medical Sciences,* November, 1921) present the following conclusions: Severe anemia, either primary or secondary, associated with late or latent syphilis, is apparently rare, twenty-five cases appearing in approximately four thousand eight hundred records in the Mayo Clinic. Pernicious anemia may be seen in association with syphilis, but no case exhibiting an incontestable etiological connection has appeared in our records. One patient with the clinical picture of pernicious anemia and a doubtful syphilitic infection has been apparently well two years as a result of treatment. Pernicious anemia in the apparent absence of syphilis may yield a positive serum Wassermann reaction. Mercury by inunction, used alone, produced an unfavorable reaction in four of nine patients with anemias, who had previously improved under arsphenamine, but all had primary anemia and subsequently showed evidences of a relapsing unfavorable course. We believe, therefore, that in syphilis with anemia mercury should be used with caution, especially if the picture suggests the primary type. Five of thirteen patients with primary anemia improved under arsphenamine. Of these two who improved and three who did not had demonstrable syphilis. Five of thirteen patients with primary anemia became worse under arsphenamine; of these two had syphilis. Five of twelve patients with secondary anemia improved under arsphenamine treatment. Of these only one who improved and five who did not had demonstrable syphilis. Only one of twelve patients with secondary anemia became worse under arsphenamine.

In our experience, then, arsphenamine has been much more effective in secondary anemia than in primary anemia, but curiously disappointing in secondary anemia with associated manifestations of syphilis. Twelve of sixteen patients improved under transfusion, four of them after arsphenamine had failed. Two of these patients showed only temporary improvement and three others died notwithstanding the improved blood picture. The effect of transfusion could only be judged with difficulty because of the conditions under which it was employed. In four of sixteen cases transfusion was without effect. Transfusion should be a preliminary to arsphenamine when the hemoglobin is below twenty per cent. Reactions to arsphenamine injections must be carefully avoided since they may produce an alarming drop in hemoglobin. No satisfactory rule for determining which patient would improve on treatment for syphilis and which would not, could be arrived at. In general half the patients may be expected to improve. The degree of improvement is not necessarily proportional to the demonstrability of syphilis. The pernicious anemia associated with undoubted syphilis, which we have seen, has run the ultimate course of pernicious anemia regardless of treatment for syphilis. Hemoglobin estimations alone are not sufficient to indicate the progress of the patient. The hemoglobin may rise and the number of erythrocytes fall at the same time. Arsphenamine treatment is safe if carefully used in anemia and should be employed in patients with undoubted evidence of the disease, and, as a therapeutic test, when reasonable suspicion of its presence exists. Transfusion must remain the ultimate resort in primary cases, and in those cases associated with syphilis in which arsphenamine has failed the best effect will be secured by both together.

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Letters to the Editors.

INTERSTATE RECIPROCITY.

Detroit, Mich., *February 11, 1922.*

To the Editor:

In connection with the interesting and instructive article of Dr. Pritchett, in a recent issue of the New York Medical Journal, permit me to call your attention to the movement toward establishment of interstate reciprocity for the license to practise medicine, which was inaugurated over twenty years ago. (See e. g., New York Medical Journal, August 12, 1899, and January 20, 1900; *Philadelphia Medical Journal,* October 21, 1899, May 18, 1901, and March 22, 1902; *Medical News,* June 9, 1900, and October 27, 1900.) The following quotation from *American Medicine,* August 2, 1902, gives a good idea of the working of reciprocity:

> A condition of reciprocity which should be accepted by all States is that eminently wise and just one that the lower standard States should accept the certified licentiates of higher standard States without demanding that the higher standard States should do the same for the low standard ones. If in State A the examinations and conditions of admission to examination are of practically the same standard as those in State B, A should admit B's licentiates who underwent the board examination. If, however, B's standards are higher, A should admit B's licentiates without asking that those of A should be admitted to practise in B. The fact that it is morally and professionally justifiable to admit candidates with a better education and training without asking that less highly educated licentiates shall be admitted to practise in the medically stronger States needs to be emphasized. One method of approximating this is shown in the fact that the State Board of Medical Registration and Examination has decided to admit practitioners of Illinois to practise in Indiana if the Illinois board will give such applicants a special certificate under its seal that they have taken the examination under the Illinois board in the subjects required by the Indiana law. The Illinois board must, however, agree to recognize applicants from Indiana under similar conditions. Moreover, according to report, the Illinois board had adopted the requirement that after January 1, 1903, the candidate must show evidence of having attended four courses of lectures of at least seven months each, and medical colleges, to be recognized as in good standing, must require as preliminary qualifications for their students a high school education or its equivalent as shown by examination. This will materially reduce the number of medical colleges recognized by the board, and puts Illinois more to the front among the States demanding higher qualifications. Under existing conditions the graduates of a considerable number of medical colleges will be barred from examination in Illinois.
>
> This raising of the standard in certain States and exclusion of the candidates of a number of other States will at once arouse the question on the part of the citizens and profession of the lower standard States, Why are our men thus excluded? Immediately there will be a demand for such an elevation of standards as will bring the desired reciprocity.

Upon inquiry I was informed by the *Journal A. M. A.,* January 18, 1922, concerning the approximate number of physicians who have been licensed by virtue of reciprocity as follows:

> Data in regard to such registrations have been published in State Board numbers of the *Journal* since the year 1907 and registrations each year since that time as follows:
>
> | | | | | | |
> |---|---|---|---|---|---|
> | 1907...... | 989 | 1912...... | 1,141 | 1917...... | 1,279 |
> | 1908...... | 1,092 | 1913...... | 1,223 | 1918...... | 972 |
> | 1909...... | 1,167 | 1914...... | 1,381 | 1919...... | 2,459 |
> | 1910...... | 1,502 | 1915...... | 1,314 | 1920...... | 2,458 |
> | 1911...... | 1,128 | 1916...... | 1,271 | | |
> | | | | | Total.... | 19,376 |
>
> In so many years there will doubtless be a number of duplications; that is, some physicians will have secured reciprocal licenses in two or more States. Such duplications, however, will certainly not exceed one thousand and may be less than that.

Dr. B. D. Harison, secretary of the Michigan State Board of Registration in Medicine, wrote me January 22, 1922, in part as follows:

> I notice that the report of reciprocal registrations made does not include the years 1903-04-05-06. Michigan issued the first reciprocal indorsement in 1903. Of course, there were not very many in these years, but sufficient to make the total number approximately twenty thousand indorsements issued since reciprocity, socalled, became a factor. And, by the way, Michigan at the present time does not use the term reciprocity, but has substituted therefor the term indorsement. Another term used frequently is reciprocal indorsement. Reciprocity socalled conveys the idea to the general practitioner and to the public that one State in reciprocity with another accepts all the licentiates of the States involved in reciprocity, which is not a fact. No State under the constitution can accept a licentiate from another State unless such licentiate fulfills to the extent of one hundred per cent. the qualifications for registration in the State to which he applies for indorsement. A State does not enter into an agreement to take defective licentiates or to indorse the looseness of administration of other States. Michigan at the present time does not enter into any agreement with other States, involving reciprocity, further than an informal agreement under Section 3, subdivision second, page 8 of enclosed pamphlet. This clause is considered a model for socalled reciprocity, and is being adopted by other States and by the Federation of State Medical Boards.

The standard of medical education has, materially, been influenced for the better by interstate reciprocity, in my opinion.

Emil Amberg, M. D., *formerly secretary of Committees in the Interest of Interstate Reciprocity and Uniform Medical Legislation.*

"DIRTY" DISEASES.

New York, *December 7, 1921.*

To the Editors:

I take great exception to a statement in your Journal of this month under the heading Collectanea. You say, "so the unclean man and woman are thieves as well as public evil. Their dirty diseases, etc."

In the first place a perfectly respectable married woman may contract the disease from husband who is a roué. On the other hand, I can show you cases where respectable men have contracted the disease from their respective wives, who were to all intents good women, but in reality harlots.

The disease is no more "dirty" than is pulmonary tuberculosis. The latter condition is, as you know, often the aftermath of fast living, etc., and yet the individual may never contract a venereal disease. I am driving at this: A man or woman may lead what is called a fast life and never contract a venereal disease, but will contract, say, tuberculosis. Why should the one be called dirty and the other call for pity?

Harry Gilbert, M. D.

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Miscellany.

Protective Power of Serum in Pernicious Anemia.—Rhea H. Zinck, Hallie M Clark, and Frank A. Evans (*Bulletin of the Johns Hopkins Hospital,* January, 1922), in investigating the protective power of serum in pernicious anemia and other conditions against hemolysis by saponin and by sodium oleate, made quantitative measurements of the protective power of human serum against hemolysis of guineapig corpuscles by saponin. At the same time quantitative measurements of the antihemolytic property of the serum against sodium oleate were made. The results of their work lead them to the conclusion that the sera of patients with hemolytic anemia and other conditions in which the liver and spleen are prominently involved in the disease process, as compared with the sera of normal persons and of patients not suffering from either of these maladies, show a marked diminution in protective power against hemolysis by saponin, and by sodium oleate. Saponin is a hemolytic agent foreign to the body, and sodium oleate is one that is probably present in the body normally.

Secondary Anemia of Infants.—In a study of socalled infantile splenic anemia or anemia infantum pseudoleukemica, Frank A. Evans and William M. Happ (*Bulletin of the Johns Hopkins Hospital,* January, 1922) present only those cases in which syphilis, tuberculosis, all known specific causes for enlargement of the spleen, liver, and lymph nodes, and all primary diseases of these organs and the bone marrow, were ruled out as far as possible by clinical procedures. The histories of ten infants are given, with a description of the blood findings in each case. An analysis of these cases shows that in infants with anemia enlargement of the spleen is common, as is also enlargement of the liver and lymph nodes, but these findings alone have no particular diagnostic or prognostic significance. The simple anemia of infants differs in its blood picture from that of adults mainly by two special reactions, a lymphocytic increase and the presence of immature cells. Leucocytosis was a variable feature. In the ten cases studied the authors found that the presence, absence, or degree of splenomegaly, enlarged liver or general enlargement of the lymph glands, the severity of the anemia, or the type of qualitative changes in the blood, bore no constant relation to each other. They state that the symptom complex has not been shown to be a disease *sui generis,* and all variations of it are probably merely an infantile response to some agent producing secondary anemia. It is not yet entitled to any special name, especially one that suggests a relationship to leucemia.

Frequency of Bacillus Influenzæ in Nose and Throat in Acute Lobar Pneumonia.—Ernest G. Stillman (*Journal of Experimental Medicine,* January, 1922) cultured the throats of 1,077 normal individuals from 1918 to 1921, isolating influenza bacilli in 332 instances, or thirty per cent. Cultures from the nose of normal individuals, made during the past year, indicate that the hemoglobinophilic bacilli are rarely found here, even in patients suffering from coryza, laryngitis, and similar conditions. In eighteen out of thirty-one lobar pneumonia cases influenza bacilli were recovered from the throat culture; in nine out of thirty-five cases of pneumonia the organisms were isolated from the nose, and in certain other cases they were recovered from the sputum when they could not be demonstrated in nose and throat cultures. In eighty-five per cent. of the thirty-five lobar pneumonia cases influenza bacilli were isolated from at least one of these sources. The significance of these findings Stillman is at present unable to explain. The influenza bacilli were of various types.

Blood Chlorides in Mercuric Chloride Nephrosis.—John A. Killian (*Journal of Laboratory and Clinical Medicine,* December, 1921) reports the results of observations made in two nonfatal cases of mercurial poisoning. As the impairment of renal function due to kidney injury progressed, there was a diminution of concentration of the chlorides of the whole blood. At the time of the greatest impairment of renal function, a marked decrease in the carbon dioxide combining power of the blood plasma was also noted. No evidence of edema was present in either case. A return to normal of the functional capacity of the kidneys was accompanied by an increase in the blood chlorides.

Breast Fed Babies Who Cry at Night.—Eugene Rosamond (*Southern Medical Journal,* October, 1921) says that habitual crying in breast fed babies at a particular time each day, usually in the late afternoon and at night, is a pathognomonic symptom of hunger. The preternaturally smart, wideawake baby is hungry. Three months colic is primarily hunger. Starvation indigestion and milk imbalance due to mother's worry, may cause true colic to supervene, but these right themselves if the baby's cries are hushed. Supplemental and complemental feeding is the remedy. Complemental feeding should be given only with a cup and spoon.

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Effects of Faulty Foods on Endocrine Glands

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Fellow of the Royal College of Physicians of London, Lieutenant Colonel, I. M. S.

I propose to direct your attention to some effects of faulty food on the endocrine glands. My observations have been confined mainly to a study of the effects on the endocrine organs of, a, inanition; b, vitamine deficiency in association with ill balance of the food, and c, fat excess in relation to the thyroid gland. Since my results, falling under the first two of these headings, have already been published, I propose to refer to them more briefly and to devote most of the time at my disposal to an account of more recent work on the subject of fat excess in relation to the thyroid gland.

Inanition gives rise to enlargement of the adrenal glands and to atrophy of all other endocrine structures. The atrophy of the thyroid is considerable and amounts to almost a third of the normal weight of the organ. In pigeons starved to death the thyroids weigh fifty-nine mgms. per kilogram of original body weight as compared with eighty-five mgms. in healthy controls. The adrenal glands increase in weight by approximately two fifths of their normal weight. In control pigeons these organs weigh ninety-five mgms. per kilogram of body weight; in starved animals they average 125 mgms. per kilogram of the original body weight of the animals. The enlargement is associated with an increase in their content of medullary secretion—epinephrine—as determined by kymographic observations in sheep.

This observation as to the effect of inanition on the adrenal glands has been confirmed by Vincent and Hollenburg not only as regards pigeons, but also in rats and dogs. In dogs, after a somewhat longer period of inanition than fifteen days, the adrenal bodies are almost double the normal weight. In rats the hypertrophy is considerably greater than in pigeons and dogs, even when inanition is less protracted.

DEFICIENCY OF VITAMINES.

Turning now to the effects of deficiency of vitamines we find changes in the endocrine organs similar to those resulting from inanition: 1, There is the same atrophy of the thyroid, the gonads, and the pancreas, and 2, the same hypertrophy of the adrenal glands, while 3, an increase in weight of the pituitary body occurs in males only. These results have been observed in all animals, irrespective of species, so far used for experimental purposes. In pigeons they occur alike under conditions of complete avitaminosis and of deprivation of vitamine B only. In monkeys, on the other hand, while the adrenal enlargement occurs in all forms of vitamine starvation and the pituitary enlargement in most forms, the latter was not observed to result from a well balanced diet of autoclaved food, butter, and onion in which both vitamine A and C were present in abundance, but from which vitamine B was absent.

These effects on the endocrine organs are observed also in pigeons fed on rice polishings, that is to say on a diet rich in vitamines but deficient in proteins and calories. In these circumstances, however, the thyroid is but little altered in weight while the atrophy of the pancreas is more marked than in the previous cases and the atrophy of the gonads less so. There was also, in the limited number of pigeons I used for this observation, no appreciable increase in size of the pituitary body while hypertrophy of the adrenal glands was approximately the same as that resulting from a diet deficient in all classes of vitamines.

In general terms, then, it may be stated that malnutrition, whether arising from complete starvation, from the incomplete starvation due to avitaminosis, or from starvation resulting from deficiency of proteins and calories, gives rise to an enlargement of the adrenal glands and sometimes of the pituitary body, with an atrophy of all other endocrine structures.

CHARACTER OF THE ADRENAL ENLARGEMENT.

1. In guineapigs a diet deficient in vitamine C causes a great reduction in the epinephrine content of the enlarged adrenals; the enlargement is associated with degenerative and hemorrhagic changes; the latter being mainly confined to the cortex. These changes are apparent in the glands before clinical evidences of scurvy are manifest. Indeed, functional impairment of the suprarenal bodies is one of the earliest, as well as one of the most preeminent, of

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the pathological features of experimentally produced scurvy. These observations have been confirmed in this country by the work of La Mer and Campbell, who have further found that the increase in weight of the suprarenal glands is directly proportional to the time during which the animals have been fed on the scorbutic diet. It is most pronounced in those whose life has been prolonged by the partial protection afforded by small but insufficient quantities of tomato juice. It follows, therefore, that impairment of adrenal function is one of the earliest results of a deficiency in the food of fresh fruit and green vegetables.

2. The enlargement of the adrenals resulting from complete avitaminosis tends to be less marked when the deficient food is more perfectly balanced with respect to proximate principles, and to be more marked when it is disproportionately rich in energy-bearing constituents. It is associated in pigeons, rats and monkeys with an increase in the epinephrine content of the organs, approximately proportionate to their increase in size, and with an almost complete absence of lipoids from the cortex. Histologically there is in pigeons a preponderance of cortical over the medullary columns of the gland. Indeed, the enlargement is to a considerable extent the result of hypertrophic changes in the cortex of the organ although the medullary cells also lengthen. The depletion of cortical lipoids is, according to the more recent work of Cramer, dependent upon the absence of vitamine A. With deficiency of vitamine B alone this severe depletion does not occur although the distribution of lipoids in the adrenal cortex becomes irregular. Coincident with the saving of lipoids in the adrenal cortex effected by the presence of vitamine A in the food, one finds, in the case of pigeons deprived of vitamine B, but receiving in butter an abundance of vitamine A, that although the enlargement of the adrenal glands is just as great there is, as a rule, no increase in the epinephrine content of the organ; on the contrary, its content of this substance is not increased in proportion to the increase in size of the gland; it is relatively diminished. The excess of fats in the deficient dietary of pigeons leads to congestive changes in the medullary columns of the organ. This congestion is present whether the fat used be butter or cocoanut oil and is related, therefore, to the effects of fat excess in association with the deficiency of vitamines B and C rather than to the presence or absence of vitamine A in the food. Associated with these changes in the adrenals there may be present degeneration of the sympathetic ganglia of the glands.

It is evident from all three facts that the functional perfection of the adrenal glands is dependent upon the balance of the food and the quantity and quality of its vitamines, and that an intimate relation exists between the adrenal glands and the metabolic processes of the animal organism.

FAT EXCESS IN RELATION TO THE THYROID GLAND.

I come now to a consideration of the effects of fat excess on the thyroid gland.

If semiwild pigeons be fed on a liberal diet of mixed grains including an excess of butter, then the thyroid gland undergoes enlargement in a larger proportion of cases (approximately sixty-five per cent.) while the adrenal glands are smaller than normal—a dual effect which, it will be noted, is the reverse of that produced by food deficiency.

If onions be added to the diet of mixed grains and butter then the incidence of thyroid enlargement is not so high (thirty-three per cent.), the enlargement is moreover not so great, nor are the adrenal glands so small as in the absence of onions.

The experiments which gave these results were as follows:

1. Eighteen semiwild pigeons were confined in a large netted wire cage, five feet by three feet by two feet. They were fed on a mixture of grains consisting of white millet seeds twelve ounces, small dark millet seeds—known in India as *ragi*—eight ounces, and split peas, of the variety known in that country as *mungdal,* eight ounces. Three ounces of fresh butter were intimately mixed by hand with the grains. The birds received this mixture daily. No sand nor grit was provided.

2. Eighteen other semiwild pigeons were similarly confined and fed on the same mixture of seeds and butter but with the addition to it of a daily allowance of six and a half ounces of freshly chopped onions. These also received neither sand nor grit.

3. Forty-two pigeons similarly confined and fed on millet seeds only, without the addition of butter, onions or sand, acted as controls to the experiment.

In all three cases water was supplied in shallow troughs suspended a few inches above the bottoms of the cages.

The experiment was carried out at Coonoor, Nilgiri Hills, Madras—6,000 feet above sea level—where goitre is practically unknown. It lasted 248-250 days; at the end of this period the birds that had survived were killed—several had died in consequence of maltreatment by their fellows. It was found that:

1. The average weight of the thyroids per kilogram of body weight was eighty-two mgms. in birds receiving mixed millet seed only; in those which received mixed grains with butter and onions, it was 128 mgms.; and, in those which received mixed grains with butter only, 183 mgms.

2. Of fifteen pigeons which received *butter and onions* the weight of both thyroids exceeded the maximum weight in controls in five cases. Goitre was present in thirty-three and one third per cent., and absent in sixty-six and two thirds per cent. of cases.

3. Of seventeen pigeons which received *butter without onions,* the weight of both thyroids exceeded the maximum weight in controls in eleven cases. Goitre was present in sixty-five per cent., and absent in thirty-five per cent. of cases.

4. On histological examination the enlarged thyroids of pigeons that received *butter and onions* presented a picture showing moderate congestion with the formation of many new acini whose epithelium did not exceed in height, or but slightly, that of the normal actively secreting gland. There was slight tendency to acinar budding. Colloid was comparatively scanty, thin and pale staining. Multiplication of acini was the essential feature of this type.

5. On histological examination the enlarged thyroids of pigeons that received *butter without onions,*

presented a picture showing little or no colloid, increase in height of the acinar epithelium, pronounced vesicular budding, irregularity in shape of the acini and plications of their walls—a picture similar to that characteristic of Graves's disease. Hypertrophy of acinar epithelium was the essential feature of this type of goitre.

The excessive richness of the food in butter was in this experiment a determining factor in the production of the thyroid hyperplasia and of the pronounced acinar budding.

A no less noteworthy result was the protective influence exerted by the onions. The addition of this vegetable to the diet of mixed grains and butter tended to lower the incidence of goitre, to reduce the average size of the thyroid enlargement, to restrain the intensity of the hyperplasia and the tendency to acinar budding, and to alter the character of the histological picture from a hypertrophic to a more vesicular type. Variations in the histological types of goitre may thus be brought about by variations in the components of a goitre producing food.

It will have been noticed that in pigeons fed on mixed grain and butter, but without onions, the incidence of goitre was sixty-five per cent. In the remaining thirty-five per cent. there was no goitre; and judged by two samples taken from the minority there was no appreciable departure of the thyroid gland from normal.

The cases in which thyroid hyperplasia did not develop have a significance second only in importance to those in which it did. They suggest that the excess of butter was not in itself the cause of the thyroid enlargement, but that it was made a potent contributing or determining cause by the operation of some other factor or factors. My previous work had indicated the important part played by bacteria introduced into the digestive tract in the causation of goitre; in contributing to the results of this experiment the possible intervention of a bacterial factor should, therefore, be considered. The restriction of such bacterial intervention would afford an explanation of the protective influence exercised by onions in restraining the thyroid hyperplasia; it seems unlikely that a sufficient explanation is to be found in an increased iodine intake consequent on the addition of onions to the dietary since onions contain little or no iodine. I think it well to insist on the probability of bacterial intervention, for my recent work on "deficiency disease" has impressed upon me the necessity for bearing in mind not only the conditions of faulty food to which animals or man may be subjected, but also the variable character of the bacterial flora with which the faulty food may be associated in the digestive tract. Here we are concerned with faulty food in relation to goitre production; in relation, that is to say, to a malady whose prevention is dependent on the provision of an adequate supply of iodine for the needs of the thyroid. It is necessary, therefore, to take count of every means by which this supply may be interfered with.

So much, then, for my original observation with regard to the effects of a diet excessively rich in butter in contributing to the production of thyroid hyperplasia of the Graves's disease type. It is hardly necessary to remind you that this hyperplasia did not involve the discharge from the gland of an amount of thyroid secretion in excess of the requirements of the tissue cells. The pigeons presenting the thyroid hyperplasia did not exhibit any other signs of Graves's disease. The resemblance to this malady ended with the similarity of the histological picture of the thyroid gland in the two cases.

This observation as to the part played by food rich in butter in producing hypertrophic goitre has recently received confirmation from the work of E. and M. Mellanby, who have reported similar results in puppies. They found that of the fats used by them butter induced the greatest degree of hyperplasia; other edible fats were less noxious in this regard. They found, moreover, that codliver oil did not produce thyroid hyperplasia and attributed this protective action to the oil's content of iodine. They comment also on the fact that the thyroid enlargement tended to be less marked when the fat fed puppies had ample opportunity for exercise and an out of door life.

In pursuance of my original observation and of the more recent results of the Mellanbys, I devised an experiment to contrast the action on the thyroid gland of *pure oleic acid,* with that of *butter* and of *codliver oil.* It is necessary to refer in some detail to the conditions under which this experiment was carried out, since these proved to be highly goitre producing. A small shelter, six feet square and open at one side, was built on the roof of the laboratory at Oxford. In contrast to Coonoor, where the first experiment was carried out, goitre is common in Oxford. A number of small netted wire cages, approximately sixteen inches square, and having a netted wire bottom beneath which was a removable zinc tray, were placed in this shelter. The cages were piled one on top of another in columns of three. Two pigeons were placed in each cage. The amount of movement possible to the birds was thus more limited than in the first experiment, and the hygienic conditions less perfect. The conditions under which the birds lived were, in short, highly favorable to the production of goitre, as the results noted in control birds at the conclusion of the experiment show. Some of the pigeons used were highly bred casters from among show birds, descended from a stock that had always lived a confined life; the tendency to goitre production was thus enhanced by hereditary factors. Twenty-eight birds were employed in the experiment which commenced on April 4th of the present year and terminated on August 26th—having been continued for a period of 144 days. The birds were fed on a shop mixture of buckwheat, wheat, split peas, barley, maize and white African maize. Each bird consumed of this mixture approximately fifty grams a day. Six were in addition given 1.6 c. c. of pure oleic acid per bird per diem in admixture with their grains; six received four grams of butter per bird per diem, and six one dram (3.55 c. c.) of codliver oil per bird per diem in admixture with their grains; it was noted that the birds ingested the major part of the several fats given. The codliver oil was the socalled "cattle codliver oil" and contained 0.002 per cent. of iodine. Six birds acted as controls; these received the same grains, in the same proportion, but no fats. They were confined in the same way (two to a cage) and in the same shelter as the birds receiving fats. One bird from each batch was killed during the course of the experiment in order to ascertain how the experiment was proceeding. The remainder were killed on the 143rd-144th days; their thyroids, and other organs, were removed and weighed, and the former photographed life size. It was found that, 1, goitre, sometimes of large size, was present in controls, in those which received butter and in those which received oleic acid; but was not present in those which received codliver oil. 2. The incidence of goitre was as high in controls as in birds that received butter or oleic acid. 3. The average weight of the thyroids per kilogram of bodyweight was, however, different. It was:

In controls	537 mgrms.
In butter fed pigeons	675 mgrms.
In oleic acid fed pigeons	909 mgrms.
In codliver oil fed pigeons	93 mgrms.

4. Great variation in size of the goitres in the first three categories was a notable feature.

The outstanding results of this experiment are, 1, the potency of the conditions of close confinement, want of exercise, overfeeding and fecal contamination of the food in causing goitre. 2. The completeness of the protection against goitre afforded by codliver oil. 3. The influence of butter in favoring the development of the thyroid swelling, and the still greater influence of free oleic acid in so favoring it. 4. The pronounced individual idiosyncrasy to the disease as evidenced by size of the goitre. The last feature is one to which I have drawn attention in the case of goitre produced in kids and in rats by means of cultures of fecal bacteria from goitrous persons. It suggests the possible influence of individual variations in metabolic rate in determining the size of the goitre, the greater needs of some individuals for iodine than of others, or the more potent operation in some cases than in others of bacterial agencies in the digestive tract in hampering the absorption or utilization of iodine. The fact that free oleic acid is more potent in favoring goitre production than butter suggests that it may be by means of the free unsaturated fatty acid derived from butter in the digestive tract that the latter exerts its harmful action on the thyroid gland.

The two main facts, brought into prominence by this second experiment, namely: that the free unsaturated fatty acid—oleic acid—is in certain cases peculiarly potent in respect to goitre production, and that codliver oil containing 0.002 per cent. of iodine, is peculiarly beneficial in respect to goitre prevention, both point to iodine as a common factor concerned in the results: It would seem that in the presence of an excess of free oleic acid the iodine in the food is in certain cases either rendered unavailable for use by the thyroid gland, or a larger amount of iodine is in these circumstances required by the thyroid gland. Or, that the absorption of oleic acid in excess creates in certain cases an increased demand for thyroid secretion on the part of the tissues. In the presence of an excess of codliver oil, on the other hand, it would appear that a supply of iodine sufficient to resist goitre producing influences of a high degree of intensity is provided by the oil. Further experimental evidence is available relative to these views.

While the second experiment was proceeding others were in progress with the object of studying the relation between fat excess and iodine intake. For this purpose tadpoles were used. It was thought that their sensitiveness to the influence of iodine might serve as an index to the harmful effect exerted by fat excess on the thyroid gland. The experiments yielded remarkable results. The tadpoles used were of the same age—eleven days—and approximately the same size. Fifty were used for each test. They were kept in white pudding dishes, each containing one litre of tap water; great pains were taken to keep the dishes clean and the water fresh. They were fed on a mixture of flour eighty-five parts, and caseinogen fifteen parts, with green pond-weed q. s. The flour-caseinogen mixture was made into a soft dough with water, and pills of it were dropped into the dishes. These the tadpoles ate greedily; cannibalism was very rare. Among the fats tested were butter, oleic acid, and codliver oil. The several fats were mixed with the flour-caseinogen mixture in the proportion of approximately one part of fat to two of the mixture. The addition of the fat enabled small pills to be prepared as above mentioned. These also the tadpoles ate greedily during the earlier part of the experiment, more sparingly during its later stage. Three series of experiments were carried out. In the first the effects on the developing tadpoles of the several fats were observed in contrast with controls receiving the same food without fats; in the second the effects of the several fats, with the addition of five tenths mgms. of iodine per gram of food mixture were observed in contrast with controls receiving the same amount of iodine but no fats; and in the third the effects of the several fats, with the addition of one mgm. of iodine per gram of food mixture, were observed in contrast with controls receiving the same amount of iodine but no fats. Details of the experiments as they proceeded have recently been published in the *Proceedings of the Royal Society*. The results reached were as follows:

1. An excess of the several fats in the food of tadpoles caused remarkable retardation in their rate of growth.

2. Iodine in amounts of five tenths to one mgm. per gram of food mixture tended to prevent the retardation of growth induced by butter and oleic acid, but not for that induced by codliver oil.

3. The compensating action of iodine varied in the case of the several fats: it was complete in the case of oleic acid, almost so in the case of butter.

4. So far from iodine exercising any compensating action on the retardation of growth induced by codliver oil, this retardation was further accentuated by the iodine.

5. The normal rate of metamorphosis was but slightly effected by the harder fats, such as butter; but was delayed by the fluid and less saturated fats: oleic acid and codliver oil.

6. The delayed rate of metamorphosis induced by oleic acid was compensated for by the presence of

one mgm. of iodine per gram of food mixture but was not compensated for by this amount of iodine in the case of codliver oil.

7. The retardation of growth induced by the fats was associated with delayed development of the thyroid gland. Iodine in the above proportion compensated for the retardation of thyroid development induced by butter and oleic acid, but did not compensate for that induced by codliver oil.

8. Finally, in a further experiment, in which tadpoles were fed on flour caseinogen mixture a hundred parts and metallic iodine one part, the abnormally rapid metamorphosis induced by the high iodine intake was considerably hastened by a high proportion of butter in a food mixture, but was markedly delayed by a similar proportion of codliver oil in the food mixture.

From these results the general conclusion may be drawn that in so far as butter and oleic acid are concerned, an intake of iodine approximately proportionate to the intake of these fats, in the food is requisite for the maintenance of normal metabolism, and for the normal functional perfection of the thyroid gland. The influence of iodine in further retarding bodily growth and development of the thyroid gland in the case of codliver oil, when administered in doses favorable to both in the case of butter and oleic acid, is not yet understood. It is to be noted, however, that this effect of iodine was the more marked the larger the dose of this element. A further contrast in the behavior of butter and codliver oil is afforded by their action in the presence of a high iodine intake by tadpoles. The abnormally rapid metamorphosis induced by the iodine was hastened by a high proportion of butter in their food, but was delayed by a similar proportion of codliver oil. While it is not yet possible to afford a complete explanation of these reverse effects of butter and codliver oil, the facts as they stand indicate an important relationship between thyroid function and the metabolism of iodine and facts. Free oleic acid, also, and codliver oil have, in respect to their relations with the thyroid gland, reverse effects; the former favors thyroid hyperplasia, the latter protects against it. In respect to iodine they seem also to have reverse relations: the former when ingested in excess requires to be combined with iodine in the approximate proportion of one part of this element to three thousand of the unsaturated fat, in order that it may be rendered harmless to tadpoles; the latter when ingested in excess by tadpoles becomes more harmful if combined with this amount of iodine.

Oleic acid also seems to exercise an effect on the thyroid gland of tadpoles which has not been observed in the case of codliver oil; nor in the same degree in the case of butter; it would appear, from the limited number of observations I have so far made, to cause a diminution of the colloid content of the gland out of proportion to its retardation in development.

The results of the experiments indicate that there is such a thing as a fat-thyroid-iodine balance, and that this balance may be disturbed either by an intake of iodine insufficient for the needs of the body in the particular circumstances in which it finds itself, or by the presence in the digestive tract of an excess of fat and more especially of an excess of free unsaturated oleic acid. Goitre may arise, therefore, either from actual or from relative deficiency of iodine. We thus have an example of a deficiency disease (goitre)—due to an insufficient supply of one essential element of the food (iodine)—arising in consequence of, or favored in its development by, excess of another essential element of the food (fat). It has become usual of late in connection with the genesis of goitre to read of "relative deficiency of iodine in the food" as though the conditions under which it may arise had been known. The present results indicate one means by which such relative deficiency may be brought about, namely, by an excess of edible fat or of free oleic acid in the digestive tract.

EFFECTS OF FOOD DEFICIENCIES IN COMBINATION WITH EXCESSES.

Let me conclude now with an example of the effects on the thyroparathyroid glands of a combination of food deficiencies and excesses: In the course of my studies on the pathogenesis of deficiency disease I had occasion to feed wild monkeys (*macacus sinicus*) on a diet composed of autoclaved rice and butter. This diet is deficient in vitamines B and C and in proteins and salts; it is also disproportionately rich in fats and starch. It gave rise to notable changes in the thyroparathyroid glands, namely, to a combination of atrophy with congestion. The average weight of the thyroid was seventy-three mgms. per kilogram of original body weight as compared with eighty-three mgms. in controls. On section the glands were found to be of the colloid type. In all cases the periacinar capillaries were much distended, each acinus being sharply outlined in whole or part of its circumference by a capillary envelope of pink staining blood corpuscles. In the three cases in which the parathyroids were found on section they were much congested and in one hemorrhagic infiltration had caused disruption of the compact mass of polygonal cells composing the glandule. I have on only one other occasion encountered similar changes in parathyroids under experimental conditions, namely in newborn rats whose mothers were fed throughout pregnancy on anaerobic broth cultures of fecal bacteria. It seems not unlikely that the hemorrhagic changes in the parathyroids were in both instances due to like toxic substances. In the former case these were permitted to exert their deleterious influence owing to the changes in the intestinal mucosa and liver which result from the deficient food. In the latter their massive doses acted through the medium of the maternal blood. However this may be, it is important to realize that a food, presenting the faults of deficiency on the one hand and excess on the other to which reference has been made above, may give rise to parathyroid changes in monkeys: an observation which may have an important bearing on the genesis of infantile tetany.

This mention of the noxious action of bacteria or of their products on the thyroid gland calls to mind one of the most important of the effects of deficient and ill balanced food on this organ. The faulty food permits of the entry into the blood stream of intestinal bacteria which acting on the thyroid may cause congestion of the organ, desquamation of its acinar cells, and distortion of its normal acinar structure. Indeed, it is possible, by examination of the thyroid alone, with but a small percentage of error, to distinguish between those deficiently fed animals that have suffered from septicemic states in consequence of the food faults and those that have not.

I trust that the results I have placed before you will serve as sufficient example of the profound disturbances of endocrine function that may be brought about by faulty food. They provide not only evidence of an important means whereby these organs are disturbed in the performance of their normal function, but afford, also a clearer insight into the nature of this function. It is a step in advance to be aware that an insufficient consumption of protein or of vitamines or the insufficient inclusion of fresh fruit and leafy vegetables in the dietary tend to impair the functional capacity of the adrenal glands; that an intimate relation exists between these organs and the metabolic processes of the animal organism; that in the maintenance of metabolic harmony much depends on the balance of power which perfectly constituted food sustains between the thyroid gland and the adrenal bodies; that an excess of edible fats in the food may, in certain circumstances, involve a relative deficiency of iodine and an undue stimulation of the thyroid gland; and that the unsaturated fatty acid (oleic acid) is peculiarly harmful in this regard.

The Effect of Endocrine Derangement on the Dental Tissues

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Until recent years most of the research work on the etiology of dental caries has had for its object the consideration of these structures in relation to their immediate environment only. Originally food, by reason of its consistency and the risk of its adhering to the teeth, and preventing the selfcleansing of the oval cavity, was considered the sole cause of caries. Later came the condition, reaction and chemical content of the saliva and oval secretions, but always and at all times the narrow view, i. e., outside influences, the tooth considered as something extraordinary, differing in every way from other organs of the body. The effect of general nutritional disturbances and metabolic influences was neglected, until about 1910, when Dr. Ewan Waller, of Birmingham, suggested that thyroid insufficiency might have some relationship to dental caries. The next step, so far as I am aware, in England at any rate, not counting some observations of my own prepared for that abortive conference, the Sixth International Dental Congress in 1914, was the work of Mrs. Mellanby, who showed that the lack of fat soluble A vitamine caused a deterioration of the dental tissues. Since that date a wider outlook has prevailed, and today most observers consider that constitutional disturbances play a not unimportant part in tooth destruction.

In a series of papers published in the *British Dental Journal*, *Dental Cosmos* and *Transactions of the Royal Society of Medicine*, I have attempted to show that, whatever the exciting causes of dental caries may be, the predisposing cause is an endocrine derangement, that a correct metabolism and utilization of lime salts is necessary, not only for perfect tooth formation previous to eruption, but for tooth health subsequently to increase its resistance to disease.

These arguments I propose to recapitulate, as briefly as possible, in this article, but I desire, in order to prevent misunderstanding, to stress the fact that my suggestions deal with predisposing causes only. I believe the exciting cause of dental caries to be carbohydrate stagnation and fermentation, causing solution of the lime salts in the enamel, through the formation of organic acid; a correct endocrine balance or otherwise bringing about an immunity or susceptibility of the teeth, in a manner that I shall describe. Further I believe that this predisposing cause is the more important of the two, for if the teeth are or can be made immune, exciting causes matter not at all; if, on the other hand, they are susceptible, then hardly will the utmost care of dentist and patient preserve them, unscathed, whatever precautions in the way of cleanliness or diet be undertaken.

First, I take it as an axiom that so long as the erupted portion of the tooth is covered completely by enamel, however thin this may be in parts, no destruction of dentine is possible, and conversely, when this enamel is destroyed throughout its whole thickness, over however small an area, so that the dentine is laid bare to the action of the microorganisms of the mouth, the tooth is doomed to complete destruction, unless artificial measures are taken for its preservation. There are, of course, exceptions to this, for example, alveolar absorption may expose portions of the roots of teeth uncovered by enamel, and caries may start there without previous enamel destruction, and that extraordinary condition known as arrested caries to which I shall refer later, but these are exceptional conditions and do not upset our premises. Consequently, it is to the enamel that I wish to confine my attention, and this is composed almost entirely of lime salts, and this enamel is bathed continuously in a fluid, the saliva, rich in lime, and slightly alkaline in reaction due to these lime salts.

CHEMISTRY.

Let us then consider for a moment the body chemistry of these salts. Lime is found in the body in two forms:

1. Fixed in the tissues as inorganic salts helping to build up the framework of the body.

2. There is in addition to this a quantity of lime present as part of the alkali reserve of the body, this is present as an ionic salt, and has many uses; the fixed lime has passed through this embryonic stage, some of this ionic lime will later be used for the purpose of body building or repairing, but in the meantime it has necessary functions to perform, not only as an alkaline salt (its necessity as such will be considered later when discussing the question of acidosis), but also because of its calcium ions. These are necessary to give tone to muscle, for the proper functioning of the heart, and also to keep nervous tissue in a proper excitable state, for without these calcium ions there can be no proper transmission of nervous excitability from nerve to nerve cell or from nerve cell to muscle.

Now lime salts must enter the body by way of the food supply, but the question of ingestion, and a balanced diet, is in itself insufficient. It is necessary to remember that, within the intestine, is not, by any means, within the body, nor is absorption by itself always sufficient, as, without utilization and fixation, they may still be lost. Lime salts may be, and often are, excreted unchanged in the feces, or they may in part be absorbed into the blood stream, utilized or not as the case may be, as ionic lime and excreted in the urine, in this case also they are useless for tooth building (I mean here not simply original calcification of tooth tissue, but the constant hardening process that I believe to be continuously going on), for this purpose they must be definitely fixed in the tooth substance. Thus we see that both absorption and fixation are necessary. Increasing the quantity in the diet, and care in selecting an easily absorbed quality, are in many cases, by themselves, quite useless for dental prophylactic purposes, a fact well recognized by the medical profession in treating conditions such as rickets and osteomalacia, both of which are regarded as being due to lime shortage. In fact, it would seem that the amount of calcium required to keep the body in health is extremely small. This has been estimated as above three quarters gram daily for an adult, and it would be a simple matter to determine how much milk alone would supply this amount, if all the lime contained therein could be absorbed, utilized and fixed; of course, if this irreducible minimum is not given in the food it is quite probable that dental troubles might ensue, but it is difficult to imagine a diet that will not contain this, short of actual semistarvation.

Gies found that a diet ordinarily considered to be deficient in lime salts produced no effect on the teeth of puppies in 127 days, and that it was necessary to reduce the calcium content of the diet of rats to three mgms. a day for seventy days before signs of demineralization were found in the teeth. This I think shows conclusively that, as regards lime salts, any diets that we have to consider give an ample sufficiency, and it is for the body itself to take, utilize and fix, what is provided, and if this is not done it is the fault of the body itself rather than of the diet. (I am leaving out of consideration the question of vitamines to which I shall refer later, and am considering only lime salts as a part of the diet.)

The next point that I want to consider is the need of lime salts during different periods of life; for this purpose a normal lifetime may be divided into three stages, viz., growth, reproduction and decay. During the first period the body is hungry for lime salts, bone and tooth building are active, and the whole body is living at a great rate; in a healthy child Nature has seen to it that this supply is forthcoming, but the margin is small, and any little upset in absorption and utilization is quickly felt, and calcium hunger may change to calcium starvation, with its deleterious effects, both from the point of view of a shortage in the laying down of inorganic lime and its fixation in the bones and teeth, and from the need of ionic calcium, as shown by the tetanic convulsions so commonly seen dring this period.

During the second period, that of reproduction, the balance between intake and output of calcium is more stable, and in men, at any rate, lime is only needed to make good wear and tear and to replace waste; in women, however, there is a difference which Blair Bell summarizes thus: "In men the reproductive calls on the metabolism are not great; their metabolism during the reproductive period, after growth has been established, is mainly concerned with individual needs, compared with women, the nerves must be steady, the mind stable, and the physical strength great, and all the endocrine glands are adjusted with this end in view, the preservation of a steady uniform metabolism, in which no sudden alterations occur. There is, therefore, little reason for pathological lesion of hyperplasia or hypoplasia to supervene in his organs of internal secretion, and this is what we find, provided that the changes at puberty do not overstep the mark. On the other hand, in women, during this period, there are bound to be sudden and rapid alterations, due to the demands of pregnancy and lactation, and with menstruation there is a large excretion of calcium and other substances previously required for growth of skeletal and other structures, but which are now no longer required until pregnancy occurs, when a fresh body is to be built up and nourished by the maternal metabolism. Thus to a certain extent, a woman by her catamenia is kept in practice and protected from too sudden and great demands on her metabolic activity, and the periodical fluctuations in her economy are provided for by the capabilities of her endocrine apparatus."

Thus we see that, during the reproductive period of life in both sexes, pregnancy excepted, there is less calcium hunger, less danger of calcium starvation, than during the period of growth, but that there is always a greater tendency to that state in women than in men, and if pregnancy supervenes, even the greater conservation that this condition entails may be insufficient to counteract this tendency, especially in women who were near the border line before.

That the calcium drain in pregnancy is considerable is well shown by the experiments of partial parathyroidectomy in cats, which showed no signs of tetany unless they became pregnant, when the convulsions occurred, showing that the condition was latent and conception only was necessary to upset a balance held with difficulty. In fact, so well is this fact recognized that the fetus has been well termed a calcium parasite.

Lastly, the period of decay, "when the fires of life burn low." Now the balance of calcium equilibrium is in the opposite direction, the tendency is for the body to receive and utilize more than is necessary, lime is not required for growth, less repair and replacement is wanted, and the excess is likely to be stored in awkward places, arteries degenerate and joint trouble commences; the tendency to calcium hunger is replaced by a tendency to calcium saturation.

Considering these points we see that the periods of life during which the desire for lime salts is most likely to overstep the supply are first and foremost childhood and early adolescence, and secondly, pregnancy, also that there may be a shortage in young, adult women. Now it is a recognized fact that these are the periods of the greatest susceptibility to caries, and that, given normal conditions of health, this susceptibility is markedly diminished as age increases, if indeed a period of immunity does not normally supervene. In fact, one can go further and say that, as the immunity to caries increases the susceptibility to pyorrhea alveolaris develops. These two diseases are believed by many dentists to be antagonistic. "My teeth do not decay, they get loose and fall out," is a common remark of patients.

The metabolism of lime salts is believed to be controlled by the endocrine apparatus, which would seem to be divided into two groups for this purpose, viz., those which regulate absorption, utilization and fixation, and those which preside over excretion.

In perfect health there is a perfect balance of calcium metabolism, just such amounts as are required at the time are utilized and the remainder excreted, and any upset in this balance, whether by increased excretion, diminished utilization or otherwise, will lead to signs and symptoms of disease. In the first group, the utilizers we place the parathyroids, the pars anterior of the pituitary, and the medulla of the suprarenal, possibly also the thymus, in group II the gonads (ovary and testis) and possibly the thyroid.

The balance between assimilation and excretion differs considerably at different periods of life, as we have seen, and the activity of the various glands regulating this action is so arranged to bring about these differences, for example, in childhood, the most noticeable feature is that the gonads are inactive, have not reached the stage of functional activity and that the thymus is present in an active state, thus placing the child in an exceptionally fortunate position to receive and utilize a large amount of lime. As the thymus deteriorates the gonads come into activity, thus passing imperceptibly into the second stage, that of a more stable balance between assimilation and excretion.

The question of menstrual flow in women, if normal, is to her advantage as we have shown, but if excessive, or if her tendency is towards undue calcium hunger, this may tip the balance, and may well account for the undoubted fact that, as a sex, their teeth are worse than those of young adult men of the same age group, but in ill health there is an interesting interaction between the ovary and the menstrual cycle which may, to some extent, regulate the loss. In pregnancy ovarian activity is in abeyance, and, as a rule remains so during lactation, thus placing the mother in a favored position to conserve her lime salts for the benefit of the child, and incidentally herself.

In old age, again, the gonads lose their potency and calcium excretion is diminished. We see, therefore, that in health the whole endocrine apparatus acting as regulators of the metabolism of lime salts, act to the benefit of the individual, at all periods of life; but that an upset in the balance between utilization and excretion will have a greater effect, or produce that effect with a milder upset at certain periods than at others, and that these periods are similar to those in which we find an increased susceptibility to dental caries.

METABOLIC BALANCE IN PATHOLOGICAL CONDITIONS.

Having now considered the question of the metabolism of lime salts in health, let me bring forward some points illustrating the question in pathological conditions. I have shown that normal balance between assimilating and excreting glands is necessary for health; what will upset this balance and in which direction will it be upset? for an upset balance in favor of the excretory group will give calcium starvation, and one in favor of the assimilators, calcium saturation.

In young children, any upset can be but in one direction, for in them we have the assimilators working unopposed, consequently any conditions upsetting endocrine glandular activity must lead to calcium starvation, at any rate, this seemed to me to be the first question to decide. I therefore examined the reaction of the saliva in children convalescent after measles and scarlet fever, titrating with decinormal sulphuric acid, using methyl orange as an indicator, taking my own saliva as a control, and found the amount of acid required to neutralize the measured quantity was from 1.6 to 1.9 c.c. as compared with 5.4 c.c. for the control, also that the calcium index of the children's salivas worked out at from .1 to .15. I then put the children on a pluriglandular substance containing extracts of thyroid, suprarenals, and pituitary, of which half a grain, one at bedtime for two nights, and found that the alkalinity had increased from 1.6 to 2.85, and from 1.9 to 3.65, and the calcium index from .1 to 1.67. Having contracted scarlet fever myself I confirmed these experiments on my own saliva and found, on the twenty-first day, that my alkalinity had dropped to three with a calcium index of .3, and in ten days, on the same pluriglandular mixture, these increased to 9.2 and 2.5 respectively. I give the figures for alkalinity for what they are worth, as I am quite aware of the disadvantages of estimations by titration, but these experiments were carried out in prewar days, before I knew much of estimation by the hydrogen ion concentration, a method which I have used more lately, but I think my figures are sufficiently accurate to suggest that an acute infection will so upset calcium assimilation as to lower the alkalinity of the saliva, and that suitable pluriglandular feeding will, according to Hallion's law, bring back the balance. The reason for the lessened assimilation being, I suppose, that the result of the toxemia is an overaction of the glands to produce autoantitoxin (Sajous) which is followed later by an underaction.

This then was a point gained and would seem to point to a reason for increased susceptibility to caries in acute illness, a condition that we know to exist; for increased alkalinity of the saliva would, doubtless, act by neutralizing organic acid at the moment of formation, whereas a diminished alkalinity, below a certain point, would be less able to do so, and although these acids would sooner combine with the alkali of the saliva, if that is not present they must perforce neutralize themselves with the lime salts of the enamel.

I next attempted to discover what could reasonably be considered to be a satisfactory alkaline index for the saliva, by taking saliva from all patients with whom I came in contact; and found as I expected considerable variation, but these variations fell into definite groups and all seemed to be explainable. For this purpose I estimated the hydrogen ion concentration of the saliva using the colorimetric method of standard tubes, as giving better and more accurate results and being simpler than titration.

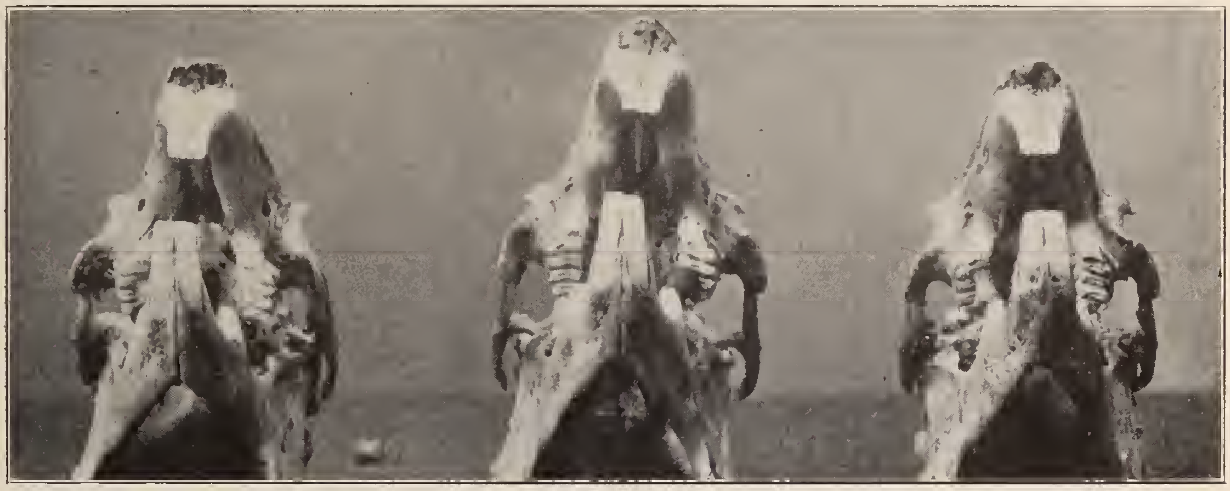

Fig. 1.—Skull of a rabbit to whose diet there was added extracts of parathyroid, anterior pituitary, and suprarenal.

Fig. 2.—Normal control skull.

Fig. 3.—Skull of rabbit where ovarian extract had been added to the diet.

I found that, in good health and in people without progressive caries (by which term I mean active destruction of enamel), the alkaline index was higher in children than in adults, but was highest of all in old people, especially in those suffering from pyorrhea with subgingival tartar formation, but that in children and adults with progressive caries and in adults suffering from illhealth, especially active tuberculosis, the alkaline index was low, in some of the latter cases I found a hydrogen ion concentration to be as low as Ph 5.8 indicating a definite acid saliva.

I was unable to combine these estimations with that of the hydrogen ion concentration of the blood, or to do any estimations of the calcium content of this tissue, owing to the lack of opportunity and apparatus, but results would have been interesting.

These results are what would be expected. Healthy children with active assimilatory glands are able to keep free from calcium hunger, in fact, they have lime salts in reserve, ready to be used for body building, an excess not required and, therefore, not present in healthy adults; on the other hand, as age increases this excess again appears, not because it is required, but because of defective elimination; where, however, the children or adults are in bad health and caries is active, we find signs of deficient assimilation.

I next changed my pluriglandular mixture to extract parathyroid one twentieth grain, extract anterior pituitary one grain, extract suprarenal one grain, two tabloids a day, together with calcium lactate ten grains, and at the end of several weeks the saliva, with a measured quantity of phenolsulphonephthalein, gave a distinct red color, whereas it was originally yellow, and the calcium index rose gradually to ten. I gave myself, in addition to these experiments, a course of intramuscular injections of a similar pluriglandular mixture, using as a control a patient whose salivary alkalinity was the same as my own, Ph 6.7, on the eleventh day my alkalinity had risen to Ph 8 with a calcium index of 9.8, the control remaining as before; this, after a period of some weeks I repeated with results that were almost the same.

This brings me to the first stage of my hypothesis, that an upset of endocrine balance predisposes to dental caries by causing a diminution of the alkalinity of the saliva.

But there is a second, and, I believe, more important, manner in which the lack of usable lime salts may affect the dental tissues, and I ask you now to follow my argument a little further.

To make what follows clear to those who are not acquainted with dental research literature, some explanation will here be necessary. A battle rages between two distinct schools, on the question of the permeability of enamel; one side laying it down as a definite fact that this tissue is dead and inert, and that it is not, and cannot be, affected by nutritional and metabolic influences, that once formed it remains unaltered and unalterable, except by destructive influences from without. The other school is just as definite that this is not so; they contend that the enamel, in young teeth at any rate, is permeable from without, and possibly from within also. I do not propose to go into the matter in this article—interested readers can find the authorities on each side in the dental literature—other than to express the opinion that Mummery's work seems to me to remove any doubt that the latter is the correct view, and clinical evidence favors this contention.

Bearing these facts in mind, let us consider for a moment two well recognized diseases presenting, in some direction, opposite symptoms, acromegaly and osteomalacia. In the former, one of the most pronounced symptoms is an increase in the laying down of lime salts in certain bones, the lower jaw is perceptibly enlarged and thickened, the skull enlarges, and if the disease presents itself before the junction of the epiphyses of the long bones, these are considerably increased in length, giving the phenomena of gigantism; on the other hand, in the latter disease there is a definite demineralization of the skeletal tissue; unfortunately in reading up this matter from a dental viewpoint, one can find but little as to the state of the teeth, our medical confrères in the past have not considered these organs sufficiently, and it is rare to find any statement of their condition. If they are mentioned at all, it is some vague remark that the teeth decay rapidly and pyorrhea is present; this we know to be a contradiction of terms, for it is rare that we find both conditions at the same time; we as dentists recognize that these two states are antagonistic, and that the teeth that fall victims to pyorrhea are, speaking generally, the hard, sound teeth that have withstood caries. I have never seen a case of osteomalacia so cannot speak as to the condition of the teeth. I have, however, during the last twelve months, had under my care two pronounced cases of acromegaly, both in women, the diagnosis of one of which I was able to confirm by a radiograph of the skull, which showed an enlarged sella turcica and great increase in the thickness of the bones of the vault of the skull. Both of these women had had their teeth removed for pyorrhea.

Now the symptoms of acromegaly are caused by an increase in the secretion of the pars anterior of the pituitary, and although I have no personal experience of the teeth of patients suffering from osteomalacia, a condition, so far as the laying down of lime salts is concerned, the reverse of acromegaly, I have lately had a patient whose condition seems to point to a disease known as dystrophia adiposogenitalis, due to hypofunction of the pars anterior of the pituitary, and she had lost all her teeth from caries; furthermore, her first child was an anancephalic monster, but she had bonny fat twins of six years old, whose temporary teeth were a mass of small amalgam fittings. These results of observation in endocrine disease are interesting, and not without point, as will be seen later in the argument.

Various ductless glands have been credited with the responsibility for osteomalacia, the suprarenal by diminished secretion (Bossi), the ovary by hypersecretion (Bell), and the pituitary by hyposecretion (Knowles), and Erdheim found a hyperplasia of the parathyroids in this disease, which, however, he believed to be due to an antagonistic response to ovarian hyperplasia; at any rate, it will be seen that it is an upset balance of metabolism in the direction of lime starvation. Thus we see, in the comparison of these two diseases, that, under certain conditions, the body has the power of fixing lime in excess (in the bones at any rate), or of yielding it up, that is of either hypercalcifying themselves or of decalcifying themselves as the case may be, and as the hypercalcification or decalcification is very excessive the results are most noticeable.

In a similar manner we find teeth with both hard and soft enamel; physiologically there would seem to be a change, a progressive hardening, as the period since eruption lengthens. Pickerill, who has measured the hardness of the enamel of many teeth, contends that other things being equal a tooth that has been erupted ten years is harder than one erupted two; in addition to this there is clinical evidence to show that pathological conditions may alter the hardness of enamel, the extremes being perhaps that in the gouty man and that in the tuberculous youth. Consequently, it would seem to be a fact that not only bones, but teeth also, may harden or soften. The hardening which is, up to a point, physiological, has been accounted for by those that deny the permeability of enamel, to be something analogous to crystallization, but this will not account for the pathological softening.

We know that the alteration in consistency in the bones, in the diseases quoted above, is due to an endocrine derangement; is it asking too much to suggest a similar causation for the alteration in the teeth? I want now to see if we have any knowledge of how this change in the fixation or the withdrawal of lime salts may be brought about, and I believe that we shall find the answer in the study of that pathological symptom complex which accompanies certain diseases, designated somewhat badly as acidosis.

ACIDOSIS.

By acidosis it is not meant, of necessity, an increased storage of acids, or acid salts, in the blood and body tissues, nor need it mean an increase in the production of acid in bodily metabolism. The definition given by Sellards is that "it is a diminution, from any cause, in the reserve supply of the alkaline bases in the blood and other tissues of the body, the physicochemical reaction of the blood remaining unchanged, except in extreme conditions," and except in extreme cases, which we are not now considering other than to use them as illustrations, when the very extremeness makes results more clear this must be so, for a very slight alteration in the reaction of blood towards acidity as measured by the hydrogen ion concentration is incompatible with life.

In the normal metabolism of food stuffs there is a constant tendency to the production of acid radicals, arising from the combustion of carbon, phosphorus and sulphur, which exceed the basic radicals present, consequently, to preserve the alkaline reaction of body fluids, this excess acid must be got rid of, and this is accomplished normally by several different methods, for example, acids from the blood can be removed from the body by the lungs by respiration, in the form of carbon dioxide; by the kidneys in the form of acid salts; by neutralization with ammonia formed in the metabolism of nitrogen, and lastly by using up the body supply of alkaline salts extracted from the foods; each and all these methods are utilized in health, when a constant fight is being maintained to keep down an ever threatening acidosis.

Thus we see that, even in health, acids either formed endogenously within the body, or taken in food, do slowly and gradually act as a drain on the alkali reserve of the blood and tissues, and if health is to be maintained this reserve must be continuously replenished, and this is done by the utilization of the salts of sodium, potassium, magnesium and calcium, the absorption and utilization of which is under the control of the endocrine apparatus. In health this reserve, though never large, is sufficient, but in disease several factors may cause shortage; for example, there may be an increased production of normal acids, or even abnormal acids may be formed, some diseases of the kidneys may upset the delicate mechanism by which its power of discrimination and alkali saving may be lost. Alkali itself may be lost in other ways than in neutralizing acid, as, for example, by excretion in acute diarrhea, or even the absorption and utilization of alkali may be interfered with; at any rate, this reserve supply of alkali becomes diminished in quantity and insufficient for its purpose.

Extreme conditions of acidosis are met with clinically in such diseases as diabetes, and in the last stages of some cases of nephritis; it is also seen in certain foods intoxications in children, in pregnancy, and certain other conditions, and is easily recognized by its physical signs. There are, however, many conditions in which an acidosis has been found to exist by chemical laboratory methods, when there has been no acute symptoms, that is, when it has been proved that the alkali reserve of the body is reduced to a greater or lesser extent, these cases have been termed by Sellards "compensated acidosis." Now it must be remembered that this compensation has been brought about at the expense of the patient in other ways, for example, the alkali reserve, though sufficient to preserve life, may be at a dangerously low ebb and unable fully to carry out the purpose which it was originally intended that it should perform. Sellards has shown, by using the bicarbonate toleration test (which is performed by giving large doses of sodium bicarbonate until the urine turns alkaline), that a diminution of the normal alkali reserve equivalent to forty to fifty grams of sodium bicarbonate was unaccompanied by any noticeable clinical symptom, that a deficit of from seventy-five to one hundred gms. gave definite dyspnea, while a deficit of from one hundred and fifty to two hundred grams was required to produce definite air hunger and coma.

Consequently there must be many cases in which an acidosis is present which, by its very compensation, gives a lower alkali reserve, with all that this may mean to the patient, without any definite signs or symptoms of disease.

I am not suggesting that calcium is the most important element in the alkali reserve—it is not—but that these salts are a part, and an important part, I have authorities to quote. Merriott and Howland working on the acidosis in the terminal stages of nephritis, found a marked diminution of the calcium in the blood serum, as low in one case as one and five tenths mgms. to one hundred c. c. of blood, as compared with ten to eleven mgms. in normal cases. This low calcium content they believe to be due to an excess of acid phosphate which the damaged kidney could not excrete. At any rate, administration of phosphate caused a further diminution of calcium of the blood serum, whereas administration of calcium reduced the acid phosphate, presumably by neutralization.

I think, therefore, that we are justified in believing that calcium salts form part of the alkali reserve of the body, and so long as they are a part they have an important action, part of which is the gradual and continuous hardening of the teeth, both enamel and dentine. If, however, they are commandeered for a more vital purpose, viz., keeping the patient alive by overcoming or compensating an acidosis, they are not available for their primary purpose, and the teeth must perforce go without, and for the time being remain unhardened, i. e., susceptible to caries. Further, I believe that this is not all. It would seem probable, and I find several authorities for my suggestion, that should the acidosis be more severe a definite demineralization may take place associated with the pulling down of lime salts from bones and teeth, i. e., that the teeth themselves may be called upon to give up some of the lime salts they already have, lime that they have built up into definite tooth structure, giving thus not merely a stoppage in tooth building, but a very definite breaking down.

Let us pause for a moment to see what clinical evidence we have for this suggestion. The condition in osteomalacia we have already referred to; here the bones may become so soft that they can be cut with a knife, or squeezed like a sponge. Lime salts are certainly abstracted from them. There would seem to be evidence also, from a dental point of view, and this is found in the condition known as arrested caries, a condition not uncommon, in which the tooth is found with a very considerable amount of the crown destroyed, generally the whole of the enamel missing, and the exposed dentine hypercalcified, polished and of a dark brown color. Now this is something quite different from caries as ordinarily seen, and the process by which it has been brought about must have been different from the very commencement. Instead of beginning as a minute destruction of enamel, allowing the microorganisms of the mouth to invade and destroy the dentine, undercutting the enamel in all directions, which latter tissue then chips away, we have here first a wholesale destruction of enamel, and followed by little, if any, of the dentine, which, contrary to expectation, instead of being almost at once destroyed, becomes preserved by hypercalcification, and the tooth may in this condition last for many years.

This condition is commonest in the young, and can generally be traced to an illness, probably one of the exanthemata, and I suggest that the influences at work are, that the necessity of the neutralization or elimination of toxines causes an increased activity of the endocrine apparatus, which is later followed by a reaction, giving a lessened assimilation of lime salts, which combined with an acidosis associated with all acute fevers and caused by increased catabolism, gives a lowered alkali reserve. The bodily call for alkali leads to rapid tooth destruction, then during and after convalescence, the gland balance reasserting itself with, perhaps, a compensating swing of the pendulum in the opposite direction, we get a hypercalcification of the dentine. If, however, this beneficial reaction is too late to save the pulp, we get the dead six year old molar level with the gum in a child of from eight to ten years old.

I have not been able to find much literature on the connection between endocrine derangement and acidosis, but references are continually cropping up, and it would not seem unreasonable to connect the two, for the satisfactory working of the endocrine apparatus is an important factor in metabolism of the alkaline salts, on which depend the alkali reserve, which is the final source of safety in a threatened acidosis. This idea is upheld also by the fact that the periods of calcium hunger which, as I have shown, are also the periods of the greatest risk of endocrine derangement and are the periods of life during which there is most chance of an acidosis without definite disease, viz., childhood and pregnancy.

Of the former period Howland says, "The low level of carbon dioxide tension and the low hydrogen ion concentration in the young explain their susceptibility to acidosis which he contends is not an uncommon condition in infancy and childhood." Sellards says, "Some chronic acidosis during the period of growth might conceivably bear a relation to some of the effects of malnutrition seen in children"; and pregnancy is, as we know, a state in which the risks of an acidosis are considerable. Again Crile has shown that a state of acidosis was present combined with signs of exhaustion of the adrenals, thyroid, and pituitary in a number of diseases, infections, exhaustion, and psychical states.

To cause endocrine imbalance I fed rabbits on gland extract. Rabbits were chosen for this experiment as it seemed probable that there might reasonably be a relationship between length of teeth and their hardness, the incisors of these animals being of continuous growth, kept at a certain length by wearing at the biting edge. If they hardened beyond a certain point, they would not wear as quickly, and consequently would increase in length, and vice versa. I therefore took three rabbits of the same litter, one month old, kept them under the same conditions and fed them with the same food, except that to the food of No. 1 was added extract parathyroid, one tenth grain; extract anterior pituitary, one grain; extract suprarenal, one grain, and to that of No. 3 was added extract ovarian, five grams. At the end of three months the rabbits were killed, and it was found that the lower incisor teeth of No. 1 were fifteen mm. in length, those of No. 3 ten mm., of No. 2, the control, fourteen mm. long. (Fig. 1.)

How then may this endocrine derangement be brought about? I take my classification of causation chiefly from McCarrison.

1. In direct disease of any one gland or group of glands, e. g., myxedema, acromegaly, or diabetes.

2. Functionally as a result of overstimulation, due to acute exanthematous fevers, acute or chronic infections, bacterial toxines.

3. Defective or improper feeding, e. g., semistarvation or lack of vitamines.

4. Residence in unsanitary surroundings, intestinal toxemias, stasis, and constipation, consanguinity and heredity, psychic causes, fear, rage, pain, worry, insomnia.

This classification is of course incomplete, but it gives an idea of the variety of causes which may bring about the condition. I do not propose to discuss these causes, except to call your attention to the question of vitamines which from our point of view is today very much to the fore. Mrs. Mellanby has shown that feeding with foods otherwise sufficient, but from which vitamine A has been abstracted, leads directly to deterioration of the dental tissues, and just lately Howe has even produced what would appear to be definite carious cavities in the teeth by a vitamine free diet, but so far as I know neither have shown the morbid process by which these effects are produced. McCarrison provides the connecting link, for he proves conclusively that food deficiencies have a definite action on the endocrine apparatus, and it is through the various glands which form this apparatus that these changes in the teeth are brought about.

SUMMARY.

1. So long as the enamel remains intact there can be no caries.

2. Enamel, in health, progressively hardens as life proceeds.

3. This hardening is due to a progressive laying down of lime salts, taken from the body store of ionic calcium.

4. This bodily store is, in health, equivalent to the need of the individual at the time, and is preserved by the endocrine apparatus, which also is the fixer of lime salts in the teeth.

5. If the endocrine apparatus is thrown out of balance in the direction of calcium starvation, this reserve store is diminished, and fixation of lime salts in the teeth is interfered with.

6. An upset in endocrine balance in childhood, youth and pregnancy will be in the direction of calcium starvation.

7. Calcium starvation will lead to a diminished calcium index in the saliva, with a lessened alkalinity of that secretion, thus directly leading to caries.

8. Endocrine derangement, leading to a loss in balance towards calcium starvation, will tend to cause a condition of acidosis, by lessening the alkali reserve of the body; in the compensation of this condition the calcium salts, together with other alkaline salts, will be utilized for acid neutralization, and therefore not available for hypercalcifying teeth.

9. If the acidosis be more severe, built up and fixed inorganic lime will be torn away from bones and teeth to help build up this alkali reserve and thus preserves life, lowering resistance of teeth to caries.

10. That, without this susceptibility to caries, exciting causes, i. e., food fermentation, matter not at all, but if immunity be removed, hardly with any reasonable care and attention preserve them entire.

11. That endocrine derangement will account for all the conditions leading to dental caries, whether they may be diet, lack of vitamines, altered salivary secretion or what not.

Endocrine Interactions

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It has been universally conceded that the glands of internal secretion are functionally interdependent. Between them there is a constant interchange of forces which lend themselves to analysis and interpretation. Not at all infrequently we find a gland having as a close neighbor another gland which tends to work in an antagonistic manner to its more voluminous *vis à vis*. We see this in separate structures, such as the parathyroids and the thyroid or, if I may be permitted to include them in this conception, the pineal and the pituitary. By no means is the antagonism at all times removed from the gland but not infrequently the Tarpeian rock stands right in the glandular Capitoline hill incorporated indissolubly with its structure. This is evident in the medulla and cortex of the adrenals as well as in the gonads where the Leydig cells (the socalled interstitial cells) are antagonized by the germinal or spermatogenic cell groups. Beside these apparently antagonistic tendencies there are definitely protagonistic functions to be met with in the interglandular arrangement, so much so that not at all infrequently one gland, when in a state of seeming dysfunction, will be compensated for or its function will be temporarily assumed by its logical protagonist. This is most frequently observed between the pituitary and the thyroid and the adrenals.

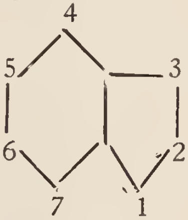
To enable the practitioner to acquaint himself at a glance with these reactions of glandular interplay I thought a schematic representation with here and there explanatory remarks would be acceptable to the interested physician who has little time to search the literature for his peremptory needs. To begin with, let me offer an analysis of the interaction which occurs in the time honored medullary *piqûre*. In analyzing such a scheme it becomes apparent that the glands with internal secretion contain more than one biodynamic ingredient, which in one case may stimulate a certain function in another endocrine organ, and in another instance depress a certain function in the same gland.

It seems that the first effect of the *piqûre* is to stimulate the adrenals which bring about a double effect: first, the irritability of the sympathetic nervous system is greatly increased, and secondly, the sugar density is diminished to an extent insuring increased osmosis and the elimination of the carbohydrate through the renal epithelium. The injury to the socalled sugar centre also causes an increased elimination of glycogen from the liver, and in this regard it is sufficient to overcome the normal pancreatic function, which tends to enhance the storing of glycogen in the liver cells. Although it may seem from a study of the diagram (Fig. 1) that the *piqûre* directly influences the liver cells, this idea must not be entertained, for no remote effect can be had without a messenger, be this a chemical hormone or a neural discharge of energy. So in the diagram the message travelled most likely by way of the sympathetic nerves reaching the liver, which secondarily gives off an increased quantity of glucose to the blood with a resultant hyperglycemia. The sugar density being diminished through increased adrenal activity it appears in the urine.

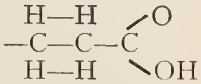
It is not possible to assort all the processes of life in terms of gland activity, though medical science came to regard these structures as having a hand in every manifestation, normal or otherwise. Much is yet to be discovered, and many older views changed before the endocrines will be unshakably established on *terra firma*. And even then I may state with safety that all the hormonal side chains of a gland will not be discovered for many decades, and that organic chemistry will be able to alter these side chains so that they will give a different expression to the static and dynamic trend.

Kendall was able to demonstrate this with his recently discovered thyroxin. This substance is to all intents and purposes a closed chain organic substance with three iodine atoms attached to an indol derivative. Although this is not intended as a chemical exposition of thyroid activity or its crystalline derivative thyroxin, an insight into the structure and plausible function of the latter will add a great deal to the seeming chemical enigma which envelops most endocrine processes. For this reason it will be absolutely in order to give the reader a bird's eye view of the function of thyroxin as experienced by Kendall and the clinicians of the Mayo Foundation, bearing in mind the possibilities which a slight change in the chemical structure is capable of producing on the living organism.

First, it must be remembered that all indol rings hail from the well known structural ingredient (Baustein) tryptophan. Graphically I will represent the indol nucleus as follows, giving Kendall's numerical arrangement of the various positions:



The iodine in thyroxin is in the 4-5-6 position while the nitrogen atom is at -1-. At -3- is placed the propionic acid radical and at 2 we have an atom of oxygen. From an analysis of Kendall's figures one is impressed with the fact that all changes of a chemical nature take place at the position -1- and -2-, and the most important ones at the nitrogen position. With this closed chain structure one may produce by means of well known organic chemical procedures substances containing additional hydrogen groups,



$$\begin{matrix} \mathrm{H}-\mathrm{H} & \diagup\mathrm{O} \\ -\mathrm{C}-\mathrm{C}-\mathrm{C} & \\ \mathrm{H}-\mathrm{H} & \diagdown\mathrm{OH} \end{matrix}$$

but then, according to the above mentioned observer, the new substance becomes physiologically inert.

It is also possible to change the molecule so that it will retain its property to influence growth only and have no effect whatsoever upon the metabolic rate. It was definitely determined that in order to retain the property of influencing the metabolic rate the iodine side chains are not absolutely essential, whereas for the developmental influence these side chains at four, five and six are important. In fact, workers in the field of biological endocrinology were able to influence metamorphosis of the tadpole with compounds of iodine which had not even the remotest resemblance to the thyroxin molecule. We can now understand why in therapeutics so little was accomplished with iodine compounds in so far as the influence upon the metabolic rate was concerned.

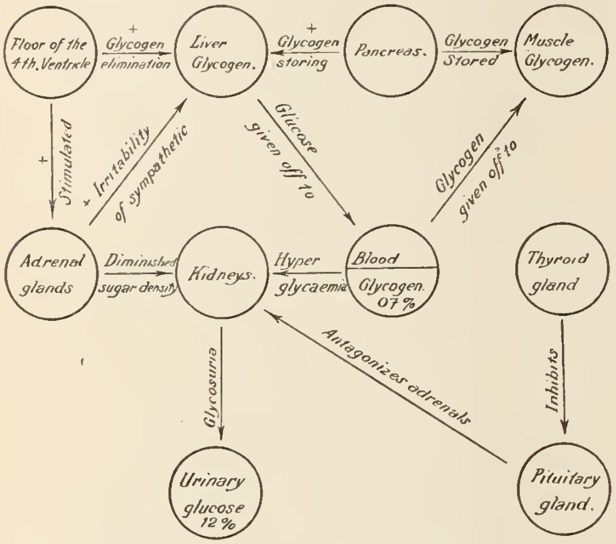


Fig. 1.—A schematic representation of endocrine interactions.

Now then, if it is possible for a substance in its crystalline purity to possess more than one function, as is the case with thyroxin, are we not straining at a gnat when we are attempting to reduce the thyroid gland as a whole to fit our conclusions derived from observations on the living subject? There may be a thousand functions in the thyroid and the other glands of which we have not the slightest knowledge, and which are nevertheless essential to life and health. At the present time we must content ourselves with the grossest generalities and hope that the future will bring more definite clues regarding the manifold workings of these structures. In view of this, even though the diagrammatic scheme of glandular interplay may be correct, they do not by any means represent the sum total of activities which they are actually capable of during life's phases in man or the lower animals. They will, however, enable the reader to see the general trend grossly depicted and be of use in obtaining a bird's eye view of the commoner interactions. Let me offer first the endocrine factors of growth. (Fig. 2.)

The hormonal display shown in Fig. 2 gives us a view of the endocrine factors concerned in calcium metabolism and growth. Up to puberty the growth of the skeleton proceeds unchecked, and even up to the twentieth year, when the fully functionating gonads, having grown to full size, inhibit the further development of the skeleton. Should the hypophysis functionate improperly before the full development of the gonads took place then we encounter the clinical state known as gigantism. This, of course, entails a nonunion of the epiphyses through calcification, which is much delayed, permitting a stretching out of the body to almost gigantic heights, even over seven feet. After epiphyseal union, the long bones no longer grow, but the skull, facial bones and the bones of the hands and feet become larger, giving us the picture of acromegaly. That the gonads have no voice in the production of acromegaly can be deduced from the fact that full grown adults do not show the least skeletal change after castration nor after implantation of gonadal tissue. Disease of the gonads which completely destroys the spermatogenic apparatus, as well as the cells of Leydig, and conditions requiring the total removal of both testes in the full grown adult showed no skeletal alteration. Of late we were enabled to observe the effects of gonadal implantation and could at no time detect skeletal changes.

The endocrine properties of the ductless glands may be represented as follows:

THE THYROID.

Stimulates.—Regeneration of tissues; growth of hair; fineness of skin; intelligence; cortical cerebral cells; calcium metabolism; nitrogen metabolism; reciprocally with thymus (before puberty); growth of skeleton; gonadal development; mydriasis; adrenal medulla; bone marrow formation.

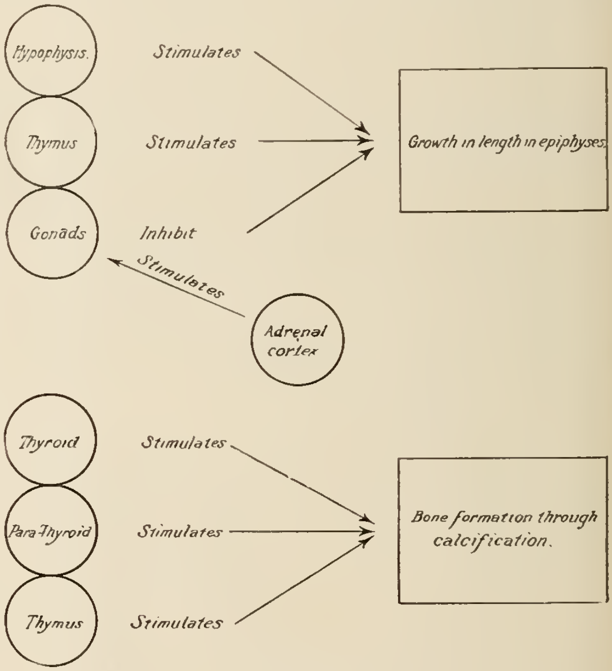


Fig. 2.—A schematic representation of the endocrine factors concerned in calcium metabolism and growth.

Inhibits.—Adrenal cortex; carbohydrate assimilation; hypophysis; pancreas (pancreas also inhibits the thyroid); spleen; excessive fat panniculus; blood pressure.

The rôle played by the thyroid in stimulating the bone marrow is confined to the increased formation of red blood corpuscles. We see in this the possible why and wherefore of the good clear complexion of thyrotrope individuals, who all possess a fine skin and a very good color. On the other hand, the biological valence of the thyroid which inhibits the activity of the spleen tends to impair the color of the skin and markedly diminish its hemoglobin content. This is due to the checked function of the spleen, which is the most important structure concerned in the storing of iron in organic form which it derives from the destruction of the red blood corpuscles which have served their term of utility and are no longer needed as oxygen or pabulum carriers, their place being taken up by younger cells. The result of such an interference during puberty is the well known clinical picture of chlorosis.

In so far as the inhibition of blood pressure is concerned, we have the corroborative evidence of animal experiments, where a lowering of the pressure has been observed experimentally. This feature is to be regarded as an expression of function in an animal with otherwise normal endocrines. The same does not take place in an individual where ample evidence is at hand to doubt the existence of such a well balanced state of affairs. Let us consider the thyrogenic diabetic in whom the blood pressure is often increased. Referring to the diagram we find that the thyroid gland stimulates the adrenal medulla. We may legitimately ask the question whether the thyrogenic glycosuria is to be regarded as a direct pancreatic inhibition or are we nearer the truth when we consider the glycosuria to be analogous to the *piqûre* where the adrenal medulla is stimulated, the glycogen storing qualities of the liver impaired, and the colloid glycogen is permitted to leave the liver and circulate in the blood stream as the crystalloid glucose, producing first a hyperglycemia and secondly an appearance of the carbohydrate in the urine. Together with the increased blood pressure it would appear to me that the effect is rather an adrenogenic one instead of being primarily a pancreogenic situation.

THE PITUITARY.

Stimulates.—Skeletal growth (pars anterior); ovulation (pars anterior). (Hens lay more eggs when fed with it); sugar mobilization (pars anterior) (when its function is increased); kidneys (pars posterior); produces diuresis; blood (pars posterior); cerebrospinal fluid (pars posterior); increased production; blood pressure (pars posterior); milk secretion (pars posterior).

Inhibits.—Adrenals; Leydig cells (pars posterior); sugar assimilation; gonads (pars anterior); skeletal growth (pars posterior).

The diuresis brought about by the pituitary is consequent to a greater permeability of the renal epithelium; this phenomenon is also brought about by the pituitary hormone. The diuresis is furthermore enhanced by a greater abstraction of fluids from the blood.

THE ADRENALS.

Stimulate.—Bone marrow (medulla only); gonads (cortex only); spleen (medulla only); myelin of nerves (cortex only) thymus (medulla only); Arrectores pilorum; muscle tone (skeletal, visceral, vascular); intestinal peristalsis (cortex only); blood pressure; glycosuria; salivary flow.

Inhibit.—Pancreas (medulla only); skeletal growth (cortex only); fatigue; intestinal peristalsis (medulla only); excessive hydrochloric acid secretion.

If one were to estimate the importance of glands with internal secretion from the amount of blood traversing its tissue the adrenal no doubt would occupy a first place. Its blood supply is even greater than that of the thyroid which is five c.c. to the gram of gland a minute, while that of the adrenals is six to seven c.c. Its nerve supply is an additional voucher to its importance, for the adrenals receive no less than thirty-three filaments from the suprarenal, renal, celiac and phrenic plexuses. In fact, when its vital importance is properly gauged, it becomes the most essential gland, not only to health but to life itself. In his wisdom the Almighty gave us two to meet emergencies, and even to these two there is a scattering of adrenallike tissue throughout the body. Aside from influencing the rest of the body, the adrenals in themselves are markedly influenced by the various physiochemical reactions which the organism is capable of. During pregnancy the adrenals hypertrophy, but this phenomenon is much more noticeable in the cortex than in the medulla. With great muscular activity causing fatigue the double refracting granules in the adrenal cortex diminish in number. Another interesting feature is the adrenal abnormality in that rare monstrous birth resulting in what is known as an anencephalous fetus. In such a monster the adrenals resemble the structure of fetuses of the lower animals and do not possess the large cell boundary zone of the cortex of the adrenals.

Unless we exercise our judgment and attempt to correlate our seemingly disjointed pieces of information, there is no use in offering facts to the nonelaborative mind. Let me give a broader interpretation of the last fact, regarding the anencephalic monster, his poor cerebral cortex and his accompanying insufficiency *en rapport* of his adrenal cortex. According to the schema the cortex of the adrenals stimulates intestinal peristalsis. In other words, if an occasion arises requiring greater adrenocortical activity, we may expect as a consequence a greater peristaltic expression. Now then, it is well known that when the cerebral cortex overworks we have not at all infrequently the unpleasant accompaniment of loose bowels. Peristalsis is increased as a result of adrenocortical overwork. This overwork is nothing more in my opinion than the response *en rapport* with the overworked cerebral cortex. Students before an examination, business men who have to meet urgent obligations, and any phase of life which requires more than the usual expenditure of brain work, will frequently have the accompaniment of a loose bowel. On a similar trail travels the general dislike of sweets in the genuine exophthalmic goitre patient, and the reason for this is easily seen in the thyroid inhibition of the pancreas with a diminished ability to metabolize carbohydrates. On the other hand it may be safely regarded as a sign of mild hypothyroidism if the individual is inordinately fond of sweets.

THE GONADS.

Stimulate.—Thyroid; chest dimensions; mammary glands; hypophysis (pars anterior).

Inhibit.—Thymus; calcium metabolism.

THE SPLEEN.

Stimulates.—Hemoglobin (through red blood corpuscles disintegration and liberation of iron).

Inhibits.—Coagulation of blood (by destroying the blood platelets); thyroid carbon dioxide metabolism; formation of new cells in bone marrow.

THE PANCREAS.

Stimulates.—Storing of liver and muscle glycogen.

Inhibits.—Adrenals; thyroid.

THE THYMUS.

Stimulates.—Lymphatic tissue.

Inhibits.—Metamorphosis; gonads (in males).

THE TONSILS.

Stimulate.—Flow of urine.

The tonsil of late is receiving attention from the endocrine point of view. Regardless of the apparent safety with which it may be removed, it is fast becoming an organ deserving of attention and respect. It no longer is the pariah and outcast, and clinicians are beginning to recognize that its total successful removal is not entirely devoid of danger. The harmful consequences unfortunately do not follow upon the heels of promiscuous tonsillectomies, hence the ostrichlike safety in advocating wholesale enucleation of this apparently functionless structure.

Although Ott and Scott have published interesting data concerning the injection of tonsillar extracts and the subsequent diuresis, which they assert is even more potent than pituitary extract, I am quite certain that diuresis is not the only hormonal effect of these glands, and I am equally certain that the doctor who believes in the uselessness of these glands is entirely wrong and uninformed. Like the pituitary or the thyroid, there are tonsillar aspects which require its removal, but to be on the safe and sane side of therapeutics we ought to weigh the surgical interference with as great care and thoroughness as the removal of the above mentioned endocrine structures. I do not recall the exact publication of a German observer who states that after a tonsillectomy in latent tuberculosis the process becomes active and remains so regardless of the best therapy. All indices point to a useful rather than a dangerous rôle which the tonsils are called upon to perform, and we must recognize this, and leave them intact so long as they do not directly imperil health.

It may be a peculiar trait of mine to pose as an apostle of conservation and thus invite criticism, but it shall not discourage me, so long as I encounter the evil results of promiscuous removal of organs where they could have been left just as well, particularly when the inconvenience can be removed with proper medical means. In offering the adrenal influence on the spleen I am referring to its stimulating effect upon the white blood corpuscles, though in this instance the adrenals offer a check to the appearance of the eosinophiles in the blood current.

THE PARATHYROID GLANDS.

Stimulate.—Coagulation (regulating calcium metabolism); diuresis (action on renal epithelium).

Inhibit.—Metabolism (their removal causes wasting); nerve cells (conductivity); adrenals.

VARIOUS INTERACTIONS.

Intestinal secretion stimulates pancreas; duodenal extract stimulates pituitary (pars posterior); placenta inhibits pituitary (pars anterior); pineal inhibits gonads; the placental extract counteracts the galactagogue effect of the pituitary gland (pars anterior); the spermatogenic cells inhibit the Leydig cells; the Leydig cells inhibit pathological senescence.

Beside the normally interacting phenomena we possess much valuable information in pathological states produced by the removal or disease of a gland with internal secretion.

The removal of the gonads causes increased cell division in the pituitary as well as increase in the large oxyphil cells in the pars anterior.

Athyrosis in a child causes shrunken brain cells (cretinism), while in an adult a general chromatolysis of the nerve cells (myxedema) results. It also produces secondarily an increased formation of colloid secretion in the pars anterior of the pituitary, the pituitary hence becoming enlarged. In mild forms, such as hypothyroidism, the secretion of the posterior part of the pituitary is increased.

Tumors of adrenal cortex are known to have produced hypertrichosis in females, atrophy of uterus, atrophy of ovaries, and amenorrhea. Adrenal disease causes atrophy of the Leydig cells and deposit of skin pigment (melanoblastia). Diseases affecting the adrenals are diphtheria (sometimes low adrenal content); cholera (same); influenza (clinical basis adrenopenia), and overuse of aspirin (same).

Removal of the pituitary gland causes hypertrophy of adrenal cortex; increased thyroidal function; persistent thymus (removal of pars anterior only causes thyroid hypertrophy); marked retardation of development of sexual organs; adipositas diffusa (pars posterior); carbon dioxide metabolism diminished, and sugar tolerance increased. Hypopituitarism, when starting before puberty, is associated with increased sugar tolerance, small stature, ununited epiphyses, feminism, and no lunula at root of finger nail. Hyperpituitarism in the juvenile causes gigantism, in adult acromegaly, also (pars anterior) is responsible for an increased sugar mobilization in pregnancy.

Conditions affecting the hypophysis: Menstruation and pregnancy cause hypertrophy of hypophysis to such an extent that the gland may attain two or three times its normal size. This adequately explains the occurrence of the transient acromegaloid appearance of the pregnant woman. Thyroid removal affects the pars anterior with the formation of colloid, a condition also obtained in myxedema. Parathyroid removal causes a marked increase in the colloid containing vesicles of the pars intermedia. The hypophysis becomes enlarged. Hypothyroidism causes an increased secretion in the pars posterior.

These semidiagrammatic representations of endocrine interactions are by no means complete, for additional information is percolating daily into the literature. At present I shall have to be content with the small contribution offered and hope that it will clarify a condition which at first sight does not impress one as being of endocrine importance.

Study of Endemic Goitre in British Columbia

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Many theories have been propounded as to the causation of goitre, such theories being based upon some circumstance usually associated with the prevalence of the malady. In this paper the subject will be discussed first in a general manner, and secondly, in particular as it occurs in the district of Pemberton Meadows, in a beautiful fertile valley of British Columbia.

It has been abundantly proved by the experiments of McCarrison and others that goitre is primarily of bacterial origin. But, as we shall show, subsidiary factors are of no less importance. Experiment, briefly, has shown that goitre may be produced in animals, e. g., rats and goats, by feeding them on fecal material. In rats goitre was produced by fecal material whether from goitrous or nongoitrous persons, and equally by the filtrate which passed through a Berkefeld filter, and the residue which remained behind. The filtrate appeared to be nongoitrigenous to human beings. The fecal residue if boiled was nongoitrigenous to rate. The probable inference from this is that goitre is produced by toxins of certain germs. These toxins are filterable and produced goitre in small animals such as rats, but were inoperative in man, the difference, perhaps, being due to proportion of toxins to bodyweight. The residue in the filter, consisting of living germs capable of producing more toxins produced goitre. But if destroyed by boiling they did not do so, and most of the soluble toxins had already been washed through the filter. The experiments were conducted by McCarrison, though we have slightly elaborated the interpretation of them.

Now the valley in British Columbia, to which reference has been made, is sparsely populated by white people of various nationalities, all of whom are affected in greater or less degree with goitre. Their animals are similarly affected. Nearly all young animals born in the district are (or were) born with goitre. Pregnant cows imported into the district have, after six months, produced goitrous calves. Such calves are very weak at birth and many die. In some cases the goitre of the calf is so large as to prove an obstruction to birth, and the cow has died. The same is true of all other domestic animals. About eighty per cent. of foals die, owing to weakness at birth. With pigs, most of the litters come hairless, either dead or too weak to survive. Chickens are weak, find difficulty in chipping the egg, and great numbers die. Even pigs imported with their mothers are very likely to show snuffles (rickets or cretinism) which keeps them forever stunted, crippled and distorted. Grown pigs often break down in the pastures from softness of the bones. Fowls sometimes die with huge goitres, possibly from suffocation by pressure on the windpipe, and cocks often lose their power of crowing from the same cause. Many of them suffer from goitre, and some are devoid of feathers. With regard to children, babies born in the district are usually goitrous, though not apparently weak like the young animals. If fed on imported condensed milk and only water that has been boiled, infants can be kept free from goitre, but those fed on milk produced in the district soon become infected. Such was the description of the terrible blight with which this beautiful fertile valley was cursed, when one of the residents, a farmer, Mr. John Ronayne, sent a letter to me, asking for advice, in 1917. He was briefly enlightened as to essential facts, and advised to administer tincture of iodine in small doses. Thanks to his great perseverance and the extremely able manner in which he has dealt with the matter, making most careful observations, one may fairly state that the problem has now been successfully solved. Mr. Ronayne has given full permission to use his name and any of the very valuable letters which he has written to me. His last letter, dated October 11, 1920, says: "The iodine treatment has solved all our difficulties in the raising of stock, and has also been the means of preventing goitre among human beings that are born here, and others that come as new settlers. About a dollar's worth of tincture of iodine was used during the whole year, with about a hundred cattle, fifteen horses, eighty pigs, and four hundred chickens. It is really wonderful what a very small quantity of the drug is sufficient to secure healthy offspring. A few drops a month seems to be quite enough in most cases. Since I began to use it the stock has been increasing faster than we can raise feed for them." One certainly could not have a more satisfactory report. A few illustrative cases may now be cited.

Five doses completely removed the swelling from a Clydesdale stallion that had been badly affected.

Twenty small pigs, five weeks old, were fed on new cows' milk with a few drops of tincture of iodine added twice a week. They throve wonderfully, whereas formerly such pigs fed on cows' milk without iodine, would have been certain to become rickety.

Five drops of tincture of iodine were given twice weekly to pregnant cows for from one to two months. Three calves were born free from goitre, and stronger than any calves previously born in the district. Two calves born to cows not so treated, in the same spring, died.

Most of the cattle and horses treated rapidly lost the swollen thyroid. Thyroid tablets were given to a cow that had never previously had a live calf, and she gave birth to a healthy living calf.

Most of the two year old heifers' calves used to fail, but not one was lost under iodine treatment.

Some few cows that were affected with large goitres when treatment was started gave birth to calves with slightly swollen thyroids, but these same calves rapidly became quite healthy when given two or three drops of tincture of iodine twice a week.

In most cases it proved sufficient to give the iodine to the cows to prevent or cure goitre in sucking calves. In some cases where calves were wild this was the only way possible of giving them any iodine, and was perfectly successful in curing their goitres.

The milk given by these cows was also fed to poultry, after which no cases of goitre could be discerned among them, though formerly a great many were infected.

Mr. Ronayne regards milk itself (except when iodine is given) as a potent source of infection. His observations on this point are quite conclusive and of great interest. He says that a calf born with a goitre and allowed to run with the cow, grows gradually worse until weaned, when the swelling immediately begins to recede, until at two years old it is scarcely noticeable. When a calf is raised by hand the size of the swelling is in proportion to the amount of new milk given. Fed on skimmed milk, the goitre remains about stationary. Weaned altogether, the calf soon loses its big neck. Mention has already been made of the fact that infants born in the district rapidly develop goitre when given fresh cows' milk, though not when fed on imported condensed milk. Clearly, then, the milk contains the goitre germs, though whether it is infected prior to milking, or only by contamination, is a point that should be settled. The fact that skimmed milk is less potent as a producer of goitre than fresh milk is likely to depend on the growth of lactic acid bacilli, a process which is inseparable from the production of cream. It is probable that these in some measure swamp the goitrigenous bacilli.

In the district under consideration, goitre is much worse in the winter and spring than in summer. The probable reason is that in winter the animals are herded together in a confined space, owing to deep snow, fed from the same spread out hay, and drink out of the same water hole cut through the ice, so there is every facility for contamination of food and water, and constant reinfection with germs. Hence goitres are larger and young animals born in the spring are weaker or more cretinous than those born in the summer. It is also very possible that the winter milk being more infected than the summer milk is the factor which causes human goitres to be larger in the winter than in the summer, though as a fact much more milk is drunk in the warmer weather. But there is another factor which is possibly of still greater importance in explaining the seasonal variation of goitre, and that is the seasonal variation of iodine content of the thyroid gland. We have seen the remarkable influence of iodine in the very minutest doses in retarding or preventing the development of goitre. It is therefore only to be expected that goitres should be larger and more frequent at the time when iodine reserves in the gland are lowest. And that time, in the first instance, is the spring. We may now inquire why this is so. And the correct answer, we suggest, is because the thyroid is a sexual gland of which there is, of course, ample evidence that need not be discussed here. Now the spring, or termination of winter, is the natural breeding season for most animals, albeit that in certain instances two broods may normally be produced in a year. The thyroid gland, then, is poor in iodine content in the natural breeding season. Now the only untoward result that occurred from the administration of iodine in British Columbia, was that it appeared to lessen or take away the sexual instinct, or breeding capacity, in certain cases, and it was afterwards found that this was probably due to excessive doses, though at first sight one would hardly suppose that five drops of tincture of iodine twice a week would be an excessive dose for a large animal like a mare. But some of the residents soon began to complain that their sows did not come in season, and that boars showed no desire for coition. And after using iodine for about a year, it was found that one sow's litter was reduced to four, from her previous eight, and then to one, after which she became barren, and never again came in season. Then one or two more sows began to have small litters. After that the dose of iodine for sows was reduced from three drops twice a week to three drops once a fortnight, and subsequently much less. For the next two years (up to the date of the last letter) the sows averaged ten to the litter and nothing abnormal could be observed about their sexual functions. Prior to the administration of iodine it had been observed that goitrous boars had large sexual organs, and were sexually precocious. An experiment was made with a sow which had been coming regularly in season and would gnaw her way through obstacles to get to the boar. Ten drops of tincture of iodine were given daily for three months, during which time she never came in heat. She was then turned loose, and three months later, in the month of September, came in heat again. A similar experiment was tried with a young boar, with the result that sexual desire was lost and the testicles atrophied. Administration of iodine did not appear to have any such effect on cattle, though it proved difficult to breed from some of the mares.

Apparently, then, iodine is a sexual depressant to animals, except in absolutely minimal doses, and Nature arranges the breeding season when the iodine content of the thyroid is at its lowest level. There is surely some connection between these facts, though they require further elucidation. Normally the sow becomes pregnant in spring, when the iodine content of the thyroid is low. Gestation lasts sixteen weeks and the young are usually weaned at two months. At the end of another week the sow is ready to mate again. This is roughly a six months cycle. Now it has been demonstrated that the thyroid of the fetus, and of the young at birth, contains little or no iodine. The same is true of the goitrous thyroid of a young calf. And since it has also been demonstrated that feeding iodine to the mother is sufficient to cure the goitre of the sucking calf, it is obvious that the iodine leaves the mother in her milk. Hence lactation in due course uses up the thyroidal reserves of iodine, and when lactation is over the sexual functions are resumed. A repetition of four months pregnancy and two months suckling brings us around to the spring again, the normal mating season. If then no other difficulties arise, one might reasonably hazard the suggestion that in animals a low iodine content of the thyroid gland predisposes to sexual instinct, which is, on the contrary, suppressed if the iodine content becomes too high. If this is so, it is easy to see that very slight excess of iodine might be detrimental to breeding, which, in point of fact, it appears to be in certain cases. The simple remedy would be to cease giving iodine shortly before the expected estrus. In sows, if pregnancy does not take place, estrus recurs every three weeks, until successful mating. Precisely how this harmonizes with the iodine content of the thyroid requires elucidation. In the case of human beings we have administered tincture of iodine in doses varying from two to five drops thrice daily in hundreds of cases without becoming aware of any change in the sexual functions, except in cases of Graves's disease, in which amenorrhea is the rule during severe symptoms. In these cases improvement almost always occurs under iodine treatment, and the return of menstruation is to be noted as an early symptom of improvement. The vagaries of Graves's disease, however, cannot be discussed in this paper. The point on which we wish to lay stress is that although goitre is readily produced in certain districts, apparently by the ingestion of toxins of certain germs present in fecal material, and in cows' milk, and very susceptible to contaminate drinking water, yet in the presence of minute doses of iodine these toxins are impotent, and goitre with its attendant evils does not result. It is also possible to alleviate or cure this type of goitre by agents other than iodine, e. g., by administering intestinal antiseptics such as thymol and also by the use of vaccines. There are doubtless many other factors which have an influence in the production of endemic goitre. The two leading ones, as we have said, are the causal germ, and the unfailing remedy iodine, which is effective in the minutest doses. It is obvious that conditions affecting the life of the germ in the soil, absence of sunshine, presence of frost and so forth, will have a modifying influence on the one hand. And chemical factors, such as the presence or absence of calcium, or of arsenic or iron in the soil, may have an effect upon the thyroid and render it more or less susceptible to evil influences, which, however, it appears perfectly able to combat with the help of a little iodine. The particular valley of which I have written is geologically poor in calcium, and rich in iron and arsenic. The upper end of the valley is far more affected with goitre than the lower end, which is contrary to McCarrison's experience. The upper end of the valley is narrower, gets less sunshine in winter, more snow and less frost than the lower end, all factors which may modify the survival of the germ in fecal droppings, etc.

The Indians who live at the lower end of the valley appear to have some immunity, again contrary to McCarrison's experience. They live largely on salmon, fresh run from the sea. This would probably give them adequate iodine protection. But even those who come and live and work for as long as a year on the farms at the upper end of the valley, under conditions which give rise to goitre in all the white residents, appear to retain their immunity. In these localities goitre is attributed to the consumption of glacial water, which on analysis is remarkably pure and free from organic material. It is difficult to give any credence to this supposition. In conclusion it must be said that this paper has dealt with endemic goitre. I have dealt with a large number of cases of goitre, in England, which probably differ in many details. They nearly all improve considerably up to a certain point under iodine medication. But iodine does not have the same magical results in these cases as have been described with animals. Probably many cases are of too long standing, and fibrous changes have occurred in the gland. But it is also highly probable that the thyroid can be injured by many other germs and toxins, against some of which iodine does not afford such remarkable protection. Finally we desire to acknowledge our indebtedness to Dr. McCarrison for the free use we have made of his book, and to tender our best thanks to Mr. John Ronayne for his painstaking observations.

The Early Diagnosis and Treatment of Hyperthyroidism*

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As in so many other diseases so also in hyperthyroidism, an early recognition of the incipient stages of the disease is of the greatest importance. This is particularly true when the differentiation from other serious conditions, which may be mistaken for it, is so difficult. Thus many months and even years of misery and needless expense can often be avoided. Serious errors in diagnosis are often made as when the early stages of hyperthyroidism are mistaken for incipient tuberculosis, as a consequence of which the stigma of tuberculosis is cast upon a patient and a prolonged antituberculosis treatment is undergone, away from home, relatives and friends, at the end of which time the failure of this treatment is recognized and if good luck happens along the true nature of the disease is recognized and correct treatment instituted. In a careful study of a series of approximately one thousand cases of thyroid disease coming to operation, I have been surprised at the frequency with which hyperthyroidism is mistaken for other diseases the most common of which are neurasthenia, psychoneurosis, tuberculosis, hysteria, heart disease and general nervous and mental instability.

As a consequence of failure in the diagnosis of hyperthyroidism, various forms of therapy are advised and instituted. I have been interested in the variety of treatment which some of my patients have undergone. In the search for focal infections numerous teeth, if not all, have frequently been extracted, the healthy as well as the infected. Sinuses have been drained, tonsils and adenoids removed, and appendectomy and suspension operations for ptosis done. Sanatorium treatment is prescribed for the nervousness and in a considerable number of cases for suspected tuberculosis. Medical treatment with a great variety of sedatives, digitalis for the heart and tonics of various kinds are prescribed. These may all be given in the absence of a correct diagnosis and even when the diagnosis is made, the promiscuous use of iodine, iodides, thyroid extract, various glandular extracts, such as pancreas, ovary, and suprarenal gland and finally x ray treatments is all too prevalent. Many of these drugs and extracts have little or no beneficial effect and with some positive harm can be done. When one realizes the prolonged physical suffering of these hyperthyroid patients and the loss both physically and economically caused by misdirected therapy, the great need of early recognition of the disease is impressed upon the clinician.

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Hyperthyroidism, as the word implies, is a condition resulting from overactivity of the thyroid gland whether the latter is involved in a definite pathological process or not. Whenever there is, as a result of this overactivity, an excess of the thyroid hormone or toxin in the circulating fluids of the body, there results a syndrome which usually is fairly characteristic of the disease. The specific thyroid hormone, thyroxin, which has been isolated in crystalline form by Kendall of the Mayo clinic, is a most powerful drug, a small fraction of a grain being sufficient to cause symptoms when administered hypodermically. When this substance is elaborated in excess amounts it produces a syndrome of a rather characteristic nature, varying to be sure, in intensity of symptoms and signs according to the degree of excess secretion of the thyroid hormone.

It may be of advantage to describe some of the more important symptoms and findings in order to help in the recognition of the complex syndrome of hyperthyroidism. It is important to note the symptoms which, as a rule, precede the well known cardinal symptoms and signs as described in the textbooks. We should not wait for these cardinal symptoms and signs to develop for these were cardinal in the days before newer methods of diagnosis appeared and are characteristic more of the fully developed disease.

EARLY SYMPTOMS.

One of the earliest and most common symptoms which I have found in many patients is weakness or asthenia. This is such a characteristic early symptom that I have come to look upon it as a more important feature than even nervousness. For I have noted that even in the more extreme grades of hyperthyroidism nervousness may be almost absent. The patient is tired most of the time. She feels tired even without exertion, as on getting up in the morning. The slightest effort is often followed by the greatest fatigue, in fact, the asthenia is so great that the patient will not make even an attempt to do anything. In the higher degrees of hyperthyroidism, however, patients will often overexert because of the great stimulation they are receiving. As a result complete exhaustion may occur.

Loss of weight is common and early as a result of increased metabolism, the combustion of foods being very rapid. An unaccountable progressive and fairly marked loss of weight makes one suspicious of hyperthyroidism particularly when other diseases, such as tuberculosis and diabetes, can be excluded. It is interesting that this loss of weight may be present even when the appetite is large and the digestion still good. In fact a hearty appetite is common in the early stages of hyperthyroidism.

The nervousness which is early and common is of variable nature and is often described as an inward nervousness, the outward appearance of the patient being relatively calm. The nervousness is often localized to the chest or precordium and described as resembling a constant quivering or movement on the inside. On the other hand, outward manifestations of nervousness are also present, such as the twitching of the face muscles, irregular, frequent jerky movements of the hands, fingers and skeletal musculature, a jerky hasty speech, frequent winking, quick movements of the eyeballs and tremor.

Irritability is common and characteristic. A woman may notice that small household duties which she enjoyed before become very taxing and annoying. She may become irritable and cross with members of the family over trivial matters. A mother may become thoroughly impatient and intolerant of her own children when these reactions have not been present before. The reaction as a result of the irritability is out of all proportion to the exciting factor. Mental and nervous symptoms are also early and common and reveal themselves in changes in memory and disposition. A patient who was formerly cheerful and optimistic becomes depressed and discouraged over causes which she cannot assign. There is a tendency to increased emotionalism with frequent crying spells often without apparent cause. The most severe, socalled "blues," may be present. Lack of concentration, inability to apply oneself to a particular work or problem, forgetfulness of names, of the plot of a story or of newspaper news just read are common.

Slight lapses of memory may occur as when a good housewife begins to notice that she lays away objects and subsequently forgets where she placed them. Apprehension is another common complaint. The patient fears everything; she feels that something dreadful is going to happen, expects calamities for no reason, and frequently fears going insane. Vasomotor changes are found. The hands and feet are usually cold and clammy and there is difficulty in getting them warm. There may be alternating flushing and blanching of the face and neck.

Some or all of these symptoms may be present in an early case of hyperthyroidism and in the higher degrees of intoxication they become more distressing. Thus there is an annoying throbbing of the heart, often described as palpitation, and also of the larger arteries in the neck and extremities. The nervousness becomes more extreme and in addition the patient complains of marked restlessness, insomnia, bad and exciting dreams, a trembling over the whole body, weakness of the knees, marked depressions, increased perspiration and flushes, marked tremor, increased loss of weight, digestive disturbance with loss of appetite and diarrhea. These may be followed by the severe symptoms consequent upon deterioration of the heart and other organs, accompanied by vomiting, complete loss of appetite, ascites, edema, mental excitement, even mania, continuous diarrhea and eventually there may result a fatal outcome from acute hyperthyroidism or cardiac failure.

PATHOLOGICAL CHANGES.

Before considering the signs which one may expect to find in a thyroid gland which is becoming overactive and therefore the source of intoxication of the patient with thyroxin, it may be well to consider what pathological changes occur in the gland. Let us consider first those changes from the normal which occur in the alveolar parenchyma. As in every other secreting gland, activity of the thyroid gland is accompanied by an increase in size and number of secreting cells and also in the number of ascini. There may or may not be an accompanying increase in the colloid content. In fact, the colloid diminishes in amount more and more with the increasing activity of the thyroid and the appearance of the higher grades of parenchymatous hypertrophy and hyperplasia. It is probable that the colloid is called upon for more rapid transportation of the active hormone secreted by the alveolar cells and is thus more rapidly absorbed by the circulating blood and lymph. You see, therefore, that if the thyroid gland enlarges with increase in activity as it usually does, and there is at the same time a diminished amount of colloid present, the resultant growth can only be due to increase in size and number of the epithelial cells and bloodvessels.

As the gland cells increase in size and function there must of necessity be a greater blood supply for it is from the blood that the thyroid cell extracts the increased amount of oxygen and the elements of nourishment and secretion needed for the increased protoplasmic activity present. Therefore, as would be expected, in the majority of hyperplastic goitres, be they of the type of puberty hyperplasia or exophthalmic goitre, one finds a moderate often marked increase in size of the entire gland which is often uniformly enlarged as against the findings in adenoma which we shall discuss later. The gland is fairly firm and elastic in the puberty hyperplastic type because of the moderate amount of colloid present. In the more advanced stages of activity, as in exophthalmic goitre, the gland becomes quite firm, has a surface granular or fairly lobulated feel due to the glandular hyperplasia and is firmer in this instance because of the relative absence of colloid. An interesting, striking and helpful sign is the demonstration of increased vascularity by means of the stethoscope which reveals distinct bruits over the thyroid vessels at the poles and often over the gland itself. This early sign, when demonstrable, indicates that there is an increased vascularity of the thyroid and therefore increased function, since the two go hand in hand. In addition to the bruits demonstrable with the stethoscope, thrills are palpable particularly over the superior and very often over the inferior thyroid arteries.

Continuing now with the changes in the gland in the other forms of goitre, let us take up the findings in adenoma to which I should like to draw particular attention in the diagnosis of goitre. In order to appreciate the origin and development of adenomata of the thyroid, let us trace their origin for a moment. In every normal thyroid gland there are numerous dormant cell rests in the interstitial spaces commonly known as the interstitial or fetal cells. These cells do not form acini and therefore take no part in the formation of the characteristic colloid. They are socalled embryonic thyroid epithelial cells which retain the potentialities of developing into thyroid tissue, although of abnormal kind, at practically any stage of life giving rise to single or multiple, circumscribed, discrete and encapsulated benign tumors which may vary in size from microscopic bodies to those the size of a pin head and from this up to and as large as a grapefruit. They may occur singly or in groups in any portion of the thyroid gland or may occur in great numbers involving the entire gland. Since there are doubtless thousands of these dormant cell rests you can readily see that they are capable of developing into great numbers of adenomata.

The thyroid gland, the seat of adenoma formation, presents rather typical signs. The adenomata are often so small as to be palpable only with difficulty or they may escape detection altogether and hence the physician is rarely able to make a positive diagnosis of hyperthyroidism. One must always keep this group in mind for it is possible to have hyperthyroidism even before the adenomata have gotten large enough to be readily palpable. I have had this demonstrated to me at the operating table so often that I feel that I should stress this point.

The diagnosis is made by exclusion after a careful consideration of the history, clinical findings and by the help which is given by laboratory tests, which I shall discuss presently. In a gland the seat of larger adenomata, one can usually see and feel an irregular goitre composed of nodules which are diagnostic of adenoma and not of hyperplastic goitre. When such discrete nodules can be felt, and there is an associated syndrome suggestive of hyperthyroidism, one is almost certain that the condition is one of true hyperthyroidism and not one of the many simulating nervous conditions. There is, in such a case, sufficient pathological change in the gland to be the cause of the symptoms of which the patient complains. These adenomata are pathological new growths of a benign nature and have the power of elaborating a toxic secretion very analogous to the thyroxin secreted by the thyroid gland. At any rate the symptoms produced by adenoma are very similar to those which one can obtain by the giving of thyroid extract or thyroxin.

I wish to mention now a further interesting group of thyroid disorders, characterized among other things, and in so far as the thyroid is concerned, by a mild to moderate enlargement of the gland caused by a very remarkable overgrowth of the interstitial cells with an associated atrophy and almost complete disappearance of the alveolar element. It is this type which has come to my attention in the last few years, which I have described in previous articles (5) and to which I have given the name of diffuse adenomatosis. The thyroid gland is fairly firm, more or less uniformly enlarged, does not contain adenomata and does not have the demonstrable increased vascularity as shown by the absence of thrills and bruits. The syndrome in this case is one of latent chronic hyperthyroidism. The differential diagnosis is very difficult and is often mistaken for tuberculosis but with the knowledge gained from my recent studies and with the aid of my epinephrin test (7), which is positive in these cases, the true nature of the disturbance is recognized.

One of the principal signs, which might be mentioned as occurring in the milder stages of hyperthyroidism is tremor which at first may be only occasionally present as after emotional stress but later in the higher degrees becomes prominent and very annoying, making it impossible for the patient to lift even a cup to the lips. The tremor of the extended fingers is of a fine rapid flexion and extension type. Together with this there may be twitching of the larger muscles in the extremities and a quivering of the smaller muscles about the eyes, nose and mouth.

Tachycardia is a common though not constant finding. In the higher degrees of hyperthyroidism tachycardia is almost always present, varying from 100 to as high as 160 to 180 a minute or occasionally even higher. As a result of the stimulation of the sympathetic nervous system by the thyroid toxin, the accelerator mechanism of the heart is stimulated with the resultant tachycardia. On the other hand, I should like to emphasize that one should not fail to think of hyperthyroidism simply because there is no striking acceleration of the pulse. A patient with a definite hyperthyroidism which is easily noticeable during or after exertion may, while at rest, have a normal pulse. The lability of the pulse should be emphasized. A pulse sensitive to emotion or exertion, at which times a pulse of 70 or 80 may reach 100 or 120, is common. This is particularly true in adenoma and diffuse adenomatosis, not so much so in the hyperplastic types of goitre as in puberty hyperplasia and exophthalmic goitre.

Exophthalmos, a sign dependent upon overaction of the smooth muscle of the orbit with pulling forward of the eyeball, is a sign which one sees quite commonly in the higher grades of hyperplastic goitre exemplified by exophthalmic goitre. Protrusion of the eyes is absent or only mild in puberty hyperplasia, very rare in adenoma and never found in diffuse adenomatosis. One should therefore not place too much emphasis on this sign for in the majority of cases of hyperthyroidism there is no exophthalmos.

There is also a similar absence of the other associated eye signs, namely, the inability to converge, the Moebius sign, and the incoordination of eyeball and upper lid giving rise to the von Graefe sign. Increased throbbing of the precordium and larger arteries, such as the carotids, is fairly common. Vasomotor signs are frequently found, such as cold, clammy hands and the sudden blanching and blushing of the face, chest and hands, giving rise to alternating sensations of heat and cold. Perspiration is usually increased. Loss of weight is common though not always present and may be extreme. Dermatographism, probably also dependent upon vasomotor sensitiveness, is a common finding. I shall not mention the signs of deterioration resultant from prolonged and excessive thyroid intoxication, such as the various cardiac irregularities in rhythm and later in competency due to myocardial weakness with decompensation. Hypotrichosis is the rule, in fact in exophthalmic goitre cases there is an almost entire absence of body hair and there may be noticeable thinning and falling out of the scalp hair.

CLINICAL TESTS.

I may speak now briefly of the two most valuable clinical tests which we have today for the detection of hyperthyroidism, namely, my own epinephrin hypersensitiveness test and the basal metabolic rate determinations.

It has been shown as a result of abundant physiological research by a number of investigators, such as Eppinger, Falta, Rudinger and Hess of the Viennese School, by Asher and Flack in Berne, and by Cannon (1) and Levy (6) in this country, that in hyperthyroidism experimentally produced and in a few instances of clinical hyperthyroidism, the sympathetic nervous system is hypersensitive to epinephrin chloride, and in states of clinical hypothyroidism or after thyroidectomy in animals there is an increased tolerance to injections of epinephrin. Applying this knowledge to a study of approximately five hundred patients suffering with disorders of the thyroid gland (3), I found that the patients with hyperthyroidism uniformly showed a remarkable sensitiveness to small doses of epinephrin subcutaneously administered. This hypersensitiveness is an early sign and expresses itself in increase of blood pressure and pulse and in exacerbation of the clinical signs and symptoms characteristic of the disease. This response to the injection of epinephrin is in proportion to the degree of hyperthyroidism present. All cases of hyperthyroidism, whether produced by exophthalmic goitre, adenoma, puberty hypertrophy and hyperplasia or diffuse adenomatosis of the thyroid gland were verified by careful histological study of all the operative material with especial reference to the occurrence of mitochondria as criteria of functional activity (2). As a result of my studies on this subject a clinical test for hyperthyroidism was evolved (3, 4, 7). This test always confirms and usually establishes the diagnosis of hyperthyroidism. When positive the test is an indicator of hypersensitiveness of the sympathetic nervous system. There is a small percentage of clinical conditions which gives an atypical reaction, and which is not dependent upon any definite pathological change in the thyroid gland. However, the test is positive in all cases of hyperthyroidism. Furthermore, of all the diseases which may possibly be associated with a hypersensitive sympathetic, hyperthyroidism is by all odds the most common. In the presence of a negative response to the test one can state definitely that hyperthyroidism is not present. To be able to differentiate even to this extent is of great value in the diagnosis of obscure cases.

The epinephrin hypersensitiveness test is regarded as mildly positive when, after the injection of five tenths c. c. of one to 1,000 epinephrin chloride solution a rise of about ten points in pulse or in systolic pressure or in both is obtained, and certain clearcut subjective and objective signs and symptoms characteristic of hyperthyroidism are brought out. Normal subjects do not react to this dose and therefore reactions from mild to very marked must be considered respectively mild, moderate and marked positive responses. The exceptions stated by some as occurring in effort syndrome and even in socalled normal individuals, and in neurasthenics do not, as a rule, give a typical, positive epinephrin response. The typical response is characteristically sustained and occurs in two phases, a primary major reaction followed by a secondary minor reaction. In one and a half hours the reaction disappears, leaving the patient practically normal. Again, the response to the drug is parallel to the degree of toxicity clinically recognizable, in a way similar to the parallelism described for the metabolism determinations in the higher degrees of toxicity. After operation followed by subsidence of hyperthyroid symptoms there is a fairly prompt subsidence of the sympathetic hypersensitiveness to epinephrin. I shall omit details of the technic of my epinephrin hypersensitiveness test, which has been described in previous published reports.

In order to interpret a test as positive it is necessary to have a majority of these signs and symptoms characteristic of the hyperthyroidism syndrome, definitely brought out or increased. Thus, there is at times a considerable exacerbation of the objective signs and symptoms; there may be an increase of ten points in the pulse and blood pressure together with a moderate increase of symptoms and signs; there may be only slight changes in pulse and blood pressure and considerable change in signs and symptoms. Any combination of this kind may be regarded as positive. One must not regard a test as negative because there has not resulted from the epinephrin injection an increase or manifestation of all the possible signs and symptoms for, in order to gain a correct interpretation, one must consider the entire clinical picture produced, just as in the disease itself one cannot require every one of the characteristic signs and symptoms to be present in order to make a diagnosis.

In the exophthalmic goitre cases the epinephrin reaction in my experience has been uniformly positive and, as a rule, remarkably parallel in its manifestations with the severity of the symptoms. There is one qualification to the latter statement, however, and that is, that in the less advanced cases the reaction which at first one might expect to be very marked is only mild as a result of the fact that the nervous system, heart and other organs, having been severely damaged by the thyroid intoxication, are unable to respond to the epinephrin. The test in these cases is, of course, unnecessary for the diagnosis.

In the colloid goitre cases, without symptoms of hyperthyroidism, the reaction is negative. In fact, in many instances of this kind, a dose of one c. c. or larger is necessary to produce any symptoms resembling those seen in cases of hyperthyroidism. If, however, a colloid goitre is functionally overactive and then accompanied by symptoms of hyperthyroidism, the reaction is mildly or moderately positive.

In the adenoma cases, in which the adenoma or adenomata were found to be active by histological examination and in which there were clinical symptoms of hyperthyroidism, the reaction was found to be positive and in proportion to the severity of the symptoms. In cases in which the adenomata had become degenerated and had lost their activity and were then naturally unassociated with clinical symptoms the reaction was nearly or entirely negative. In some cases in which there was a latent or quiescent period with absence of symptoms as a result of degeneration in an adenoma formerly active the symptoms could again be elicited by an injection of epinephrin. This was doubtless due to a certain degree of hypersensitiveness of the sympathetic nervous system which persisted for some time after the activity of the adenoma had disappeared.

In cases of adenomata of questionable activity, operation is now being advised, on the basis of a positive epinephrin test in the absence of which the diagnosis often remains entirely obscure. At operation adenomata too small to see or palpate on physical examination are often found and upon their removal striking benefits result. Accordingly, the test has led directly to a clearer conception of those obscure cases belonging to the group which I have designated diffuse adenomatosis, and to which I have made reference earlier in the paper. The symptomatology, much as in the adenoma cases, is a characteristic one, though, as a rule, unassociated with positive eye signs or microscopic changes in the gland. The symptoms are asthenia, nervousness, lability of the pulse but without definite constant tachycardia, emotional instability and a variable tremor. Without a positive epinephrin response and with a metabolic rate within normal limits, a point to be mentioned again, one would hardly feel that he was dealing with hyperthroidism, and hence would hesitate to advise operation. By some, in fact, operation is felt to be contraindicated because of the absence of increased metabolism. In such cases, however, I have had striking success following thyroid resection.

The epinephrin test has proved to be of the greatest value in the differential diagnosis of many conditions simulating hyperthyroidism, of which incipient tuberculosis is possibly the most important. It has been found, fortunately for the differentiation, that tuberculosis uncomplicated with hyperthyroidism gives a negative reaction to the test (7). This fact has afforded means for distinguishing early tuberculosis from hyperthyroidism, two conditions which clinically simulate each other so closely that mistakes in diagnosis are frequently made. Other conditions simulating hyperthyroidism and incipient tuberculosis, which might be mentioned, are psychasthenia, psychoneurosis, hysteria, neurasthenia, dementia præcox, melancholia, alcoholism, tabagism, acromegaly, arteriosclerosis, and several other diseases. Cases of this kind give essentially negative results with the test. The importance of recognizing these conditions and separating from them the cases of true hyperthyroidism for which surgical relief can be offered need hardly be mentioned. In a few cases, such as those mentioned, some acceleration of the pulse and slight rise of blood pressure were observed but in all cases there was a complete absence of the subjective and objective symptoms so important in the interpretation of a positive test. Again, in these allied conditions there might be a slight transient reaction, whereas, in hyperthyroidism cases the reaction characteristically lasts from an hour to an hour and a half.

The test has been of value, furthermore, in estimating the degree of toxicity present in the early exophthalmic goitre cases. A markedly positive reaction is often a better criterion than clinical judgment in helping to decide as to whether an exophthalmic goitre patient can safely undergo operation. The surgeon is thus warned in instances of this kind by a strikingly sharp preoperative epinephrin reaction, in which case the patient is advised to take a period of bed rest. If this has been done, a preliminary ligation of the thyroid arteries is performed. In cases in which there is a moderately sharp preoperative reaction, a thorough resection of the gland is indicated in order to gain a prompt improvement. If, in a year or more in the case of a single lobectomy in exophthalmic goitre the symptoms have not improved to the desired degree and the epinephrin reaction is still definitely positive, a second operation for removal of the remaining lobe is advised. After the second resection the epinephrin sensitiveness as a rule gradually disappears. In the case of subjects suspected of having possibly hyperthyroidism but in whom there is a negative epinephrin reaction operation is not advised, for it has been found that these individuals are rarely if ever benefited by operation.

In brief, I do not hold that the epinephrin chloride test is pathognomonic of hyperthyroid states. I would say, however, that a negative test excludes hyperthyroidism; that in all cases of hyperthyroidism the test is positive, that there are some few conditions which give a more or less typical reaction, and which are to be remembered as exceptions. The latter, I think, can be fairly well recognized after a careful history and physical examination. At any rate, I feel that the test is practically always confirmatory, in many cases diagnostic and in others suggestive of the diagnosis. It has led to further and more careful search for causes in the small percentage of exceptions. There is a remarkable parallelism between the hypersensitiveness to epinephrin and the degree of clinical hyperthyroidism present. The test has the distinct advantage of being easily made. From a therapeutic viewpoint one can, by means of the test, follow the well known variations in the degree of hyperthyroidism present from time to time and regulate the amount of gland feeding accordingly.

ADVANTAGES OF TEST.

Furthermore, the test has many advantages over either the metabolic rate determinations or the hyperglycemia test in that it is readily understood, performed and interpreted. It is not subject to errors of possible defective apparatus, requires no special training to carry out, is inexpensive, involves no calculations and is accompanied by a minimum of inconvenience and annoyance to the patient. In the mild and latent cases of hyperthyroidism it seems to be more sensitive and therefore more diagnostic than the metabolic rate tests. It is not subject to the great variations found in the case of the metabolic determinations under different circumstances and in the hands of various observers. It would seem that in one important group, at any rate, namely in the obscure adenoma and adenomatosis group of thyroid disorders, a positive epinephrin test reveals the diagnosis whereas the metabolic rate determination, being within normal limits, fails to indicate the presence of a latent hyperthyroidism. On the other hand, in cases of hyperthyroidism of severer grades of toxicity, the epinephrin determinations run as a rule remarkably parallel to the curve of increased metabolism. It is possible that in the mild and latent hyperthyroidism of adenoma and diffuse adenomatosis we are dealing with an altered secretion, which has a stimulating effect upon the sympathetic nervous system and is therefore discoverable by a positive epinephrin test, whereas, failing to produce an increased metabolism, it might escape recognition.

To Friedrich von Müller and Magnus-Levy belongs the credit of first pointing out that one of the most characteristic phenomena of hyperthyroidism is an increase in general metabolism, while in hypothyroidism there is a diminished metabolism. They suggested, further, that these peculiarities depend on the regulatory action of the thyroid secretion on metabolic processes. It would seem, therefore, that the optimum conditions of body function are dependent on a definite quantity of thyroid and synergistic secretions which can vary only within narrow limits without producing more or less serious disturbances. They noted further that in Basedow's disease patients tended to become emaciated and that the metabolism was of labile character expressing itself characteristically in alternating periods of emaciation and of increase in weight although a good appetite was usually present.

Since the metabolism in hyperthyroidism was found to be considerably above normal, then one should find in cured cases of Basedow's disease rates approaching the normal. This was found by Magnus-Levy to be true in two cases observed as early as 1895 and has been abundantly confirmed since. When the metabolic rate is high the risk of operation is considerably greater and preliminary treatment with röntgen rays was therefore recommended by Means and Aub. Similarly, other measures for preliminary reduction of thyroid activity and of the metabolic rate, therefore, have been used, particularly ligation of the thyroid arteries, following which one generally finds an improvement in the clinical condition and a fall in the metabolic rate. After thyroidectomy, usually though not always, a gradual fall of the metabolic rate coincident with the clinical improvement is observed. Means and Aub used the metabolic rate as an index to the improvement after various forms of therapy, and stated that the results after röntgen ray treatment after two or three years were as good as with surgery and recommended this treatment as a preoperative measure.

The metabolic rate test can be used with distinct advantage in the study of thyroid disorders, for example, in the early diagnosis of hyperthyroidism, in which case an early increase in the metabolic rate together with other clinical signs and symptoms would be very suggestive indeed. The measurement of the heat production gives a very accurate index of the severity of the case and of the degree of hyperthyroidism in a given patient at a given time. The metabolic rate parallels closely the clinical picture presented by the patient and also the pulse and pulse pressure. The level of the heat production is used as an index of the effectiveness of the medical treatment. The metabolic rate has afforded great help in determining the proper method of treatment in conditions of overactivity or underactivity of the thyroid and, when taken before, during and after treatment, has shown the value of that treatment, whether beneficial or harmful. Similarly, the basal metabolism forms a guide for governing this dosage in cases of hypothyroidism. Again, it has been of great help in the differential diagnosis in obscure cases such as the neuroses, neurasthenia, and chronic nervous exhaustion which may simulate hyperthyroidism but in which there is no definite increase of the metabolic rate. Again, a high metabolic rate is often a warning against surgical measures and in those cases in which the metabolic rate is bound to be rising, complete rest in bed is indicated together with preliminary ligations of the thyroid arteries or treatment with the röntgen rays. Again, the metabolic rate when frequently determined enables one to follow the management of the exophthalmic case. The surgeon is also helped, for he is enabled to choose more intelligently the type of operation indicated in a given case. He is also able to decide better as to the amount of tissue to be removed and as to when, in a case in which a complete cure is not obtained, second operation should be done.

There are certain disadvantages due to technic and interpretation in the application of the basal metabolism test in the diagnosis of hyperthyroidism. Thus, unless the greatest care is taken to prevent all muscular activity, an increase in basal metabolism always results. A substantial error would be introduced if one failed to measure the duration of the observation or allowed escape of air or oxygen around the mouthpiece, or if proper care were not taken to correct the volume of oxygen to zero C. and sealevel barometric pressure. Again, there are some difficulties of interpretation of the metabolic determinations, for there are some striking exceptions to what would be warranted suppositions with regard to an individual case. Thus, occasionally a case clearly active, clinically, fails to show any striking increase in metabolism, and vice versa. Furthermore, basal metabolism has been found increased in some conditions other than hyperthyroidism, as in certain types of endocrine disorders, fever and acidosis. Thus, for example, Means found an increase in an undoubted case of hypopituitarism showing obesity and a high sugar tolerance. He also found increased metabolism in starvation acidosis as has been found by others in the acidoses of diabetes and in normal subjects on a carbohydrate free diet. Tompkins and Brittingham have described increased metabolism in some cases of pernicious anemia. These exceptions are difficult to explain.

The treatment of hyperthyroidism may be discussed under the divisions of medical, x ray and surgical treatment. In the first place medical treatment varies according to the pathology of the goitre under consideration. The treatment of the milder type of hyperplastic goitre, namely puberty hyperplasia commonly seen in young women, in which there is a mild to moderate enlargement of the gland with accompanying symptoms of hyperthyroidism, consists in rest which is probably the most important factor, and in securing a cheerful environment with freedom from worries, anxieties and strains of all kinds. There are no medicines which to my mind have anything like a specific action in the control of hyperthyroidism. Various drugs have been used but none with enough success to warrant speaking of them as specific drugs. One drug which seems to have a considerable beneficial influence in simple cases is, hydrobromide of quinine in five grain doses, two or three times a day. Bromides and other sedatives are used more in a symptomatic way. Glandular extracts, such as adrenal, pancreas or ovary, I have seen have but little effect if any. Often valuable time is lost by procrastinating with treatment of this kind. Supporting medicines such as tonics and iron are indicated in different cases, together with the milder laxatives. Iodine, iodides and thyroid extract should not be given. The very few cases in which they may occasionally do some good are more than outweighed by the great number of cases in which the symptoms and the condition in general are made worse. In fact I have seen mild cases precipitated into more serious ones by the administration of iodine and thyroid extract. If after a period of six months the condition has not improved, or perhaps has even grown worse, one should not wait until serious damage is done to the patient's general health and her normal development and progress in school, college or elsewhere is seriously interfered with. It is time then to consider surgical measures.

In the medical treatment of exophthalmic goitre, the same routine holds as in puberty hyperplasia but is usually followed by much less success. Digitalis has little or no success upon the control of tachycardia. The drugs used are much the same. The difference here as compared with puberty hyperplasia lies in the fact that in exophthalmic goitre the toxemia is far more severe and permanent damage is very apt to follow if the condition does not react favorably to medical treatment. Bed rest is the most important factor in the treatment of these cases, some of which respond remarkably well to it. Again, there is no specific drug which has proved of value in the treatment of these cases. We do know of cases of exophthalmic goitre in which recovery was spontaneous, indicating that when Nature intends that these patients shall get well, improvement occurs without medicine at all. However, these cases are decidedly in the minority. Here again one should remember that when the patient is not improving it is a grave mistake to allow the patient to progress to the stage when permanent damage has been done to the nervous mechanism of the heart, the myocardium, the nervous system, the digestive apparatus and the kidneys. At this stage surgical intervention is attended with a considerably greater risk and followed also by less improvement than when operation is undertaken earlier, since the damage done may be to a considerable extent irreparable. I always inquire of patients with early exophthalmic goitre whether they have had the benefit of medical treatment. If in spite of medical treatment the disease has remained stationary with considerable activity still present, or has gotten worse, I advise operation, since this is almost always followed by rapid improvement and by cure in a considerable majority of cases.

In considering adenoma now we find the problem a very different one. Here we are dealing with benign pathological new growths, in other words, tumors, of probable embryonic origin and possessing the power of elaborating excessive amounts of thyroid toxin. The thyroid gland as such is, on the other hand, not concerned in the disease. The hyperthyroidism is due to these tumors developing in the gland. It is therefore as useless to my mind, and with the knowledge we possess at the present day, to try to influence these tumors by giving medicine, as it is to attempt the cure of an adenoma of the breast or a myoma of the uterus by medicine. When one or more nodules, even though small, are palpable and hyperthyroidism exists, the treatment is absolutely surgical. There are, to be sure, cystic adenomata of the thyroid which have lost their activity and are therefore unassociated with hyperthyroidism and which do not demand operation, but in these cases treatment is not necessary since there is no hyperthyroidism arising from the adenomata. Occasionally, for reasons of pressure or cosmetics, such a tumor is removed. In diffuse adenomatosis, medical treatment is not unlike that outlined for puberty hyperplasia. After a considerable trial of three to six months or more and if favorable progress is not gotten surgery should again be resorted to as the correct form of treatment.

The one form of thyroid disease in which medical treatment has had really striking results is in the treatment of simple colloid goitre, such as is common in young women, in whom we find a mild to moderate enlargement of the gland without symptoms of hyperthyroidism. I have not discussed this form of goitre simply because we are dealing with hyperthyroidism in this paper. In the discussion of the medical treatment, however, I shall refer briefly to the fact that a reduction in size of the goitre is frequently obtained by the administration of iodine in small amounts, iodides such as sodium iodide or iron iodide and occasionally small quantities of thyroid extract. Local applications of iodine are also beneficial. This is a different type of goitre in which a mild hypothyroidism is present and which therefore responds favorably to the administration of iodine. This drug causes an increased activity of the gland with increased absorption of colloid followed by reduction in size of the goitre. This is the type with which Marine, working with the school children in Cleveland, has had such startling results.

In considering the x ray treatment in goitre producing hyperthyroidism, we find that the problem is one of reducing the secretory activity to the point at which there is symptomatic relief for the patient. To gauge the amount of x ray dose as to its penetration and exposure in order to produce just the desired effect has been difficult. We know that, generally speaking, the milder doses have a stimulating effect. Larger doses inhibit and finally large massive doses produce destructive action. The dose and penetration required vary with the types of goitre under consideration, with the degree of activity present and thickness of the tissues of the neck.

The treatment with the x ray is not unattended with disadvantages and with certain risks. I have had patients who have come finally for operation who have stated that after each treatment, which was given weekly, they were extremely nervous, the heart action was rapid and they suffered with severe headache, vomiting and almost collapse, necessitating patients going to bed for two or three days after treatment. To be sure the dose was perhaps badly judged, the patient receiving possibly a stimulating dose instead of an inhibiting dose. However, since the dose varies with the patient, with the symptoms and with the type of goitre, considerable time may be lost and annoyance caused before proper dosage is determined. The treatment is often prolonged, extending over as much as two or three years. It is often expensive, and in the end resort has frequently to be had to surgery. Again, one must remember that in a case which has had prolonged x ray treatment and in which surgery is finally resorted to, the difficulties of operation are considerably increased because of the extensive adhesions produced between the various layers of prethyroid structures and between the sternothyroid muscles and the capsule of the thyroid gland itself.

In the milder types of hyperplasia, such as is seen in puberty hyperplastic goitre, x ray treatment may have an inhibiting effect upon the hyperthyroidism present. Cases belonging to this group yield often very readily to a period of rest and general medical treatment. In the more severe degree of hyperthyroidism, as seen in exophthalmic goitre, the condition may be favorably influenced by preliminary x ray treatment, making it more safe for subsequent operation. On the other hand, there are progressive exophthalmic goitre cases in which valuable time is lost, the symptoms are not relieved, and finally, operation at this late stage is attended with considerable risk. Inhibition of activity of the gland can often be attained. However, real improvement approaching a cure such as seen in the great majority of cases treated by proper surgical measures is not commonly seen. Thus far I have seen no results produced by x ray treatment in goitre that compare at all favorably with the strikingly good results indicated in the published statistics from the larger clinics in this country in which surgery of the thyroid is safely and properly carried out. The x ray treatment doubtless has a place in the treatment of the milder types of hyperplasia and in those cases of exophthalmic goitre in which the symptoms are so severe as to render operation dangerous. In these instances a preliminary series of treatment with x ray is often followed by a certain degree of favorable improvement rendering subsequent operation safe.

In speaking now of adenoma of the thyroid, the conditions are very different. Here the problem is one of inhibitive or destructive action upon one or more tumors growing within the thyroid gland. These tumors are often of various sizes and of all degrees of activity. The thyroid gland of itself, however, is not involved. To choose a dose, therefore, which would have a destructive action upon the adenomata and not at the same time an unfavorable action upon the remaining good thyroid gland, seems to me quite impossible. It is my feeling that the therapy of adenoma cases is absolutely surgical from the beginning, since the problem is one of removal of the adenomatous tumors leaving whatever of the normal thyroid gland the patient still has. The dangers of operation are in no sense the same as those in exophthalmic goitre, the operation necessitates a stay of ten to twelve days in the hospital, and in the great majority of cases one can assure the patient of a positive cure within a very brief time, often of only a few weeks. To be sure, one cannot say that the treatment with x ray has reached its ultimate possibilities, for with the increasing means of gauging penetration and dose and of preventing the possible harmful action upon the skin and other tissues of the neck, better results may be obtained. In the best hands these checks upon the therapy have been fairly well worked out, but as long as the x ray treatment is often carried out by men who are untrained and inexperienced in these finer technical methods, so long the x ray will not only fail to produce good results, but may actually do harm. A technic, therefore, which is so little understood and so generally used is, at the present time, not to be generally recommended. Again, cases which have had favorable results following x ray treatment are of too recent date still to judge whether the results are permanent and of the lasting duration which has been demonstrated to be the case after a great many successful operations for similar conditions.

The surgical treatment of puberty hyperplasia, as in exophthalmic goitre, would be the partial resection of both lobes. When this cannot be carried out with safety, as in the toxic exophthalmic goitres, preliminary ligation of the thyroid arteries is advisable. In the adenomatous goitre containing a single adenoma, the latter may be shelled out. If, however, several small adenomata are present in the thyroid lobe a generous resection of the lobe may be necessary in order to remove all, or as much as possible, of the adenoma bearing tissue. It is important in operation upon adenoma to explore the whole gland, for frequently when there is a large adenoma in one lobe, one may find upon exploration of the opposite lobe several very small adenomata, which were too small to palpate before, and which, in the course of subsequent years, might develop and grow and cause fresh trouble. I have operated in a number of instances upon the second lobe subsequent to adenoma removal from the first lobe as much as ten years previously by other surgeons. In diffuse adenomatosis generous resection must be done in order to gain the desired results.

One of the most important considerations for the physician in advising operation on goitre is the risk of the procedure. One often hears the statement that the operation of goitre is very dangerous. This is so common a statement that lay persons are quite generally under this impression, and therefore in many instances operation is postponed because of the fear of the patient until the time when surgery cannot offer much improvement. The damage done by the disease in its late stages may be so great that even though the operation may be successful, the postoperative improvement is not what patient and physician might desire. On the other hand, as is evident from the statistical reports by experienced operators in various clinics, the operation for goitre has become a very safe one, indeed. I know that in my series of approximately one thousand cases, the mortality is below one per cent. However, I do not mean to minimize the danger of operation, for is it not true that in speaking of the danger of operation the principal factor is the surgeon? In experienced hands, however, the operation is very safe, indeed; so safe that the element of danger should not deter the physician from recommending operation.

Exophthalmic goitres are not to be undertaken by any but those with particular training and experience. The operation is made additionally safe by a consideration of the factors of safety which we have available at the present day. In the first place we have the advantages of the basal metabolic rate determination and my own epinephrin hypersensitiveness test. With these helps one can tell accurately the degree of hyperthyroidism present, the basal metabolic rate being expressed in percentages above the normal, and the epinephrin hypersensitiveness test being expressed by a biological or a physiological reaction to the subcutaneous administration of epinephrin. When the basal metabolic rate is above fifty or sixty or the epinephrin test is markedly positive, as in active exophthalmic goitre, the surgeon is often warned to do a preliminary ligation of the arteries, following which a perfectly safe lobectomy operation can be performed. By having at hand the information which these tests give us, there is no excuse for a surgeon undertaking lobectomy in exophthalmic goitre when a preliminary ligation is advisable, a fact which makes the mortality results distinctly lower. In addition, I have recently been studying the occurrence of acidosis as is shown by the finding of acetone and diacetic acid in considerable amounts in the urine. This acetone is responsible for a good deal of vomiting and inability to take food and marked restlessness, which one often sees after exophthalmic goitre operations. By the administration of glucose and sodium bicarbonate solution, the socalled Harris drip, by rectum, the giving of sodium bicarbonate by mouth, and particularly by the intravenous administration of five per cent. glucose solution up to 750 or 1,000 c. c., strikingly good results are obtained. I have seen serious acidosis accompanied by pernicious vomiting and diarrhea clear up within a few hours following glucose administration in the vein. The patient begins to take food, and from that moment rapid recovery occurs.

REFERENCES.

1. Cannon, W. B., and Cattell, McK.: Studies on the Conditions of Activity in Endocrine Glands. *American Journal of Physiology*, 1916, xli, 58-73.

2. Goetsch, E.:Mitochondria in Toxic Thyroid Adenomata. *Bulletin Johns Hopkins Hospital*, 1916, xxvii, 129-132.

3. *Idem:* Newer Methods in Diagnosis of Thyroid Disorders. *N. Y. State Jour. Medicine*, 1918, xviii, 259.

4. *Idem:* Epinephrin Hypersensitiveness Test. *Pennsylvania Medical Journal*, May, 1920, xxiii, 431.

5. *Idem:* Studies on Disorders of the Thyroid Gland. *Endocrinology*, 1920, iv, 389-402.

6. Levy, R. L.: Studies on the Conditions of Activity in Endocrine Glands. *American J. of Physiology*, 1916.

7. Nicholson, N. C., and Goetsch, E.: *American Review of Tuberculosis*, 1919, iii, 109-117.

Pathogenesis, Symptomatology, and Treatment of Hyperthyroidism*

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FUNCTIONS OF THE THYROID.

Formerly regarded by some merely as a modulator of the voice, by others as a structure to beautify the throat, and by still others as a mechanical support for the larynx and as a safety reservoir for the blood supply of the brain, this organ is now generally recognized as a structure vitally concerned with the physical and mental integrity of the individual. In its physiology, the thyroid is related to the following phenomena:

1. *Metabolism.*—As a regulator of metabolism in its constructive and destructive phases, the thyroid plays the leading rôle. When the organ is normally at work, cellular anabolism and catabolism are maintained at an equilibrium whereby the weight of the individual is maintained at its standard, and the basal metabolism, socalled, is normal or zero. A deficiency of thyroid substance diminishes and an excess increases basal metabolism. Thus, in hypothyroidism the catabolic process is diminished, hence the basal metabolism may be from minus fifteen to minus forty or more, while in hyperthyroidism catabolism is increased and the calorimeter indicates anywhere from plus fifteen to plus one hundred or more. On the one hand, there is clinically an increase in weight and a diminution in physical and mental capacities with the characteristic stupid expression; on the other, the individual's physical and mental capacities are quickened, often beyond control, the patient loses rapidly in weight, frequently becoming a mere shadow of her former self, and the characteristic expression, as you well know, is that of extreme apprehensiveness.

2. *Sexual structure and function.*—The intimate relation between the thyroid secretions and the sexual organs is observed in various ways. Subjects of hypothyroidism are prone to sterility, menstrual disturbances, especially amenorrhea; they frequently present underdeveloped or malformed pelvic organs and a lack of secondary sexual characteristics. Patients with hyperthyroidism, on the other hand, frequently suffer from pelvic neoplasms, excessive menstrual flow, and exaggerated sexual libido. Puberty, adolescence, pregnancy, lactation, and the menopause, each makes its demands and often leaves its impress on the thyroid. In this regard, the thyroid has been looked upon as "the uterus of the neck."

3. *Detoxication.*—The thyroid assumes the main responsibility in the process of immunity. It has been proved beyond question that animals partially or completely deprived of their thyroid are exceedingly prone to infection, and that the administration of thyroid gland restores the natural immunity. In deficiency or absence of the thyroid secretion, the opsonic index is reduced, the ameboid movements of the leucocytes are retarded, and the patient is left at the mercy of the various infectious agencies which lurk about him.

4. *Interglandular equilibrium.*—The thyroid secretion is concerned with the maintenance of the proper functional relationship between the various other glands of the body. In Graves's disease, there is probably ovarian hypofunction. It is fairly well established that the thyroid exerts an inhibitory action on the pancreas and on the glycogenic function of the liver; it exerts a stimulating influence on the kidneys and on the gastrointestinal function. Though the thyroid is intimately related to the pituitary, suprarenals, parathyroids and thymus glands, the exact nature of this relation is not yet determined. We know that in Graves's disease the thymus and pituitary are frequently enlarged, the suprarenals often hypoactive, and the parathyroids in a state of instability.

5. *Intellectual and emotional mentor.*—An increased thyroid output stimulates cerebration and the emotions; increased cerebration and emotionalism stimulate thyroid output; thus a circle is formed which, if carried to extremes, becomes vicious.

CAUSAL FACTORS IN THYROID HYPERFUNCTION.

Now, it so happens that one or more of the five processes just enumerated in which the thyroid is concerned, if themselves disturbed by factors away from the thyroid, of intrinsic and extrinsic nature, may incite a state of thyroid hypersecretion with or without goitre or evidences of Graves's disease. For example:

1. *Metabolic disturbances,* especially those due to dietary indiscretions, such as an excess of flesh foods, tea, coffee, and other irritating and purin producing substances, are often predisposing and occasionally exciting causes of thyroid hypersecretion and general endocrine dysfunction.

2. *Sexual disturbances* in the nature of inflammatory conditions or pelvic neoplasms, but more often of a deranged central or peripheral nervous mechanism, induced by suppressed or excessive function or by sexual incompatibility, so often prove to be the direct cause of Graves's disease in both sexes that we must tactfully but thoroughly, without mincing words, go into the sexual history of each patient.

3. *Intoxications or infections,* focal or general, are conceded by all as probable causes in many instances of thyroid hyperactivity frequently associated with Graves's disease. Pyorrhœa alveolaris, chronically infected tonsils or nasal sinusitis, chronic appendicitis or cholecystitis, and other forms of intoxication may cause a flaring up of a Graves's disease syndrome, never to subside until these infectious foci are eradicated. Occasionally we find that such general infections as influenza, rheumatism, tuberculosis, and syphilis are the responsible agents.

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4. *Interglandular dysfunction* elsewhere, though the *modus operandi* is by no means clear, may lead to hyperthyroidism and to Graves's disease. Thus, it has been thought that thymus hyperfunction is responsible: that the parathyroids, pituitary, and especially the adrenals, are primarily at fault; the etiological relationship of the sexual glands has been mentioned. The theory that ovarian hypofunction is the etiological factor has many adherents.

5. *Intellectual and emotional excitation*, especially the latter, are probably most often responsible for an appearance of evidences of thyroid and general endocrine dysfunction, particularly asserting itself in the syndrome of Graves's disease. In at least nine out of ten patients with Graves's disease, I find such a factor as a starting point, and in a greater percentage of patients I find the predisposing soil to be an hereditary taint in one form or another. The patient's family history points to the existence of bronchial asthma, diabetes mellitus, epilepsy, insanity, neurasthenia, hysteria, Raynaud's disease, angioneurotic edema, Graves's disease, or just plain "nervousness" in blood relatives. A type of nervous and endocrine instability, disequilibrium, or dysfunction is inherited as a predisposing cause, and it requires but the torch of a subacute or an acute emotional strain to fire up the forces leading to exophthalmic goitre. Excessive school studies, sexual repression, obsessions, or incompatibility, the death of a relative, the tension of the battle front, being saved from a shipwreck at sea, a railroad accident, a fire, or other conditions where the instinct of self-preservation overwhelms the individual, all are potent exciting causes, leading within a short time, occasionally almost at once, to the picture of extreme apprehension, trembling, bulging eyes, heart hurry, clammy skin, and all the other evidences of frozen fright so typical of Graves's disease.

SYMPTOMATOLOGY AND DIAGNOSIS.

Though it is customary to associate hyperthyroidism with a tangible enlargement of the thyroid, this need not be the case. Theoretically, or, we should say, microscopically, a hyperactive organ soon becomes hyperplastic, which may not appear macroscopically for a long time, and indeed may never become perceptible to our senses. Even a temporary increase in thyroid function which, as we know, occurs in puberty, adolescence, pregnancy, lactation, and the menopause, most often does not cause perceptible thyroid enlargement. Occasionally, under such physiological circumstances, and in conditions of undue or prolonged mental or emotional activity, either a thyroid enlargement, a moderate hyperfunction, or both, occur and for some reason remain, and it is from this class of patients that arises the socalled early, incipient, or *forme fruste* type of thyrotoxemia or of Graves's disease. I might remark in passing that, as in the case of latent or incipient phthisis, there are many thousands of patients suffering with this larval form of Graves's disease who either never reach the physician's office or whose condition is variously diagnosed as neurasthenia, nervous indigestion, nervousness, socalled nervous breakdown, and often as early tuberculosis. These persons either recover spontaneously or become subjects of typical Graves's disease in course of time. This, as already implied, is not the usual mode of development.

Four varieties of toxic goitre are recognized: 1. The socalled puberty hyperplasia, mentioned above, usually a temporary status which may merge into toxic adenoma or into Graves's disease. 2. Diffuse adenomatosis recently described by Dr. Emil Goetsch. As I understand it, diffuse adenomatosis is a state of unencapsulated adenoma which may or may not be macroscopically perceptible, and which consists clinically of evidences of hyperthyroidism. 3. Toxic adenoma or hyperthyroidism, a condition of thyrotoxemia superimposed upon an oldstanding simple or nontoxic goitre. This condition is not to be confused with exophthalmic goitre or Graves's disease, for upon the differential diagnosis depends the plan of procedure in therapeusis and frequently the life of the patient. 4. Exophthalmic goitre, or Graves's disease, which is an affection due to a generalized neuroendocrine dysfunction characterized clinically by heart hurry, tremor, increased catabolism, and usually also by hyperplastic thyroid swelling, exophthalmos, psychical, gastrointestinal and other subjective and objective phenomena.

The following tabulation will serve to differentiate the two most usual forms of toxic goitre, i. e., toxic adenoma and exophthalmic goitre:

TOXIC ADENOMA.	EXOPHTHALMIC GOITRE.
(*Hyperthyroidism, Secondary Toxic Goitre, Basedowified Goitre.*)	(*Graves's Disease, Basedow's Disease, Parry's Disease, Flajani's Disease, Hyperplastic Goitre, Dysthyroidism.*)
1. Patient is usually of middle age.	Patient is usually a young adult.
2. Goitre present years before onset of symptoms.	Goitre often absent; if present, is of recent occurrence.
3. Goitre is essentially adenomatous, often nodular in shape, and usually large, nonpulsating, noncompressible, without thrill or bruit.	Goitre is essentially hyperplastic in nature, rarely large; usually a symmetrical thyroid fulness, often pulsating, is compressible, and presents thrill and bruit.
4. Exophthalmos and expression of chronic fright rare; no eye signs.	Exophthalmos and expression of chronic fright with characteristic eye signs usually present.
5. Tachychardia not extreme, often materially influenced by sleep and digitalis.	Tachycardia more pronounced, not materially influenced by sleep and digitalis.
6. Hypertension and myocardial degeneration common.	Hypotension common; myocardial degeneration may occur late in the disease.
7. Tremor often absent; if present, is coarse and atypical.	Tremor nearly always present and typical.
8. Mental symptoms relatively mild.	Mental symptoms relatively prominent, with occasional major psychoses.
9. Dermographia often absent; when present, is not intense.	Dermographia constant and usually intense.
10. Loss in weight comparatively slow.	Loss in weight comparatively rapid.
11. Symptoms may be produced in a normal person by administration of thyroid extract or thyroxin.	Syndrome not produced by administration of thyroid extract or thyroxin.
12. Surgical interference with thyroid eminently successful.	Surgical interference with thyroid a questionable procedure.

The precise cause of the assumption of thyroid hyperactivity by a previously nontoxic goitre is not yet known. But perhaps the cause could thus be stated: The normal thyroid gland beneath the adenomatous mass, compressed by the latter, is incapable of fulfilling satisfactorily the emergency needs of the body at all times. This leads to one of two results in course of time, either a development of myxedema from deficient function of the normal thyroid tissue, or the development of thyroid activity within the adenoma as a compensatory function. Adenomatous tissue being abnormal, its function would likewise be abnormal, and as a result a toxic oversupply of thyroid hormone is thrown into the blood, with consequent symptoms of hyperthyroidism.

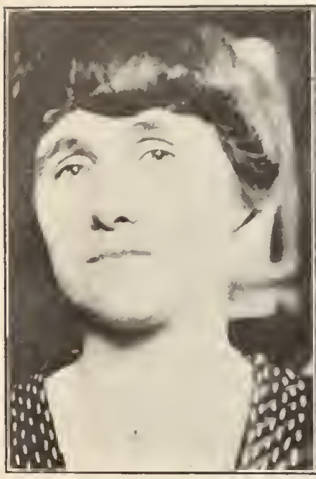

Fig. 1.

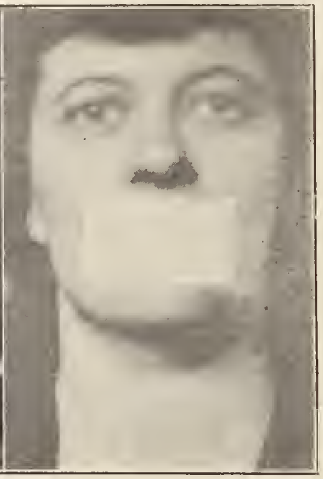

Fig. 2.

Fig. 1.—[1] Six years ago this patient underwent thyroidectomy for Graves's disease, without benefit in the clinical syndrome. When I saw her two years ago she was in a very advanced stage of the disease, weighing ninety-four and three quarter pounds, pulse was 160, and there was almost complete prostration and distressing nausea, vomiting, and diarrhea. The picture represents the result of twelve months' nonsurgical treatment, with a gain of forty-seven and a half pounds in weight and complete recovery.

Fig. 2.—Eight years ago this patient was suffering from Graves's disease of three years' duration, with a large pulsating thyroid, very extreme exophthalmos which required small pads over eyes during the night to keep them from overexposure to the air, gastrointestinal and mental symptoms. Twelve months' nonsurgical management resulted in elimination of goitre, exophthalmos, cardiac murmurs, and complete recovery with a gain of thirty pounds.

Exophthalmic goitre, an unfortunate term, should be eliminated from our nomenclature, first, because exophthalmos is not always present, secondly, because thyroid enlargement need not exist, and thirdly, because this term leads to erroneous conclusions regarding causal relationship, i. e., it frequently precipitates the idea in the mind of the clinician that this disease is goitre, that it is a state of hyperthyroidism and nothing else, that the thyroid is responsible for the syndrome, and therefore should be the main objective for therapeutic attack. Rather let us call this condition Graves's disease, and in so doing we are at greater liberty to think broadly along etiological and therapeutic lines.

A few remarks concerning exceptional conditions relevant to the subject are here in order:

1. A patient suffering from simple or nontoxic goitre, appearing in the office of her physician, and especially if he is a surgeon, may present some of the ear marks of apparent toxicity such as apprehensiveness, staring eyes, heart hurry, and even a cold, clammy skin. The patient is "scared to death" at the mere thought of an operation, and her symptoms must be construed as psychic in nature, to disappear when she leaves the doctor's office. This, indeed, is not a case of toxic goitre.

2. A patient with a simple or nontoxic goitre is quite as likely to manifest the syndrome of genuine Graves's disease as a nongoitrous individual, in the presence of etiological factors. Such a patient is an instance of nontoxic goitre plus Graves's disease, in which the preexisting thyroid growth bears no etiological relation to the syndrome, and is therefore not a case of toxic adenoma.

3. A patient with a simple or nontoxic goitre, as well as any one else, may happen to suffer with neurasthenia, or just socalled nervousness. These patients must also be observed carefully lest we err in diagnosis. Basal metabolism observations here and in the above instances will assist in diagnosis.

4. In the course of events in a subject of Graves's disease, not only are we frequently confronted with atypical symptoms in the form of a predominance of sympatheticotonia over vagotonia, and vice versa, but often we find a confusion even greater. I have reference to an alternation or a combination of hyperthyroidism and hypothyroidism in the same individual.

5. When, during the course of Graves's disease, the symptoms begin to disappear and the patient begins to gain enormously in weight and there is a gradual onset of mental and physical sluggishness, we are confronted with a case of burned out thyroid, i. e., a status of myxedema due to degeneration and exhaustion of the overworked organ.

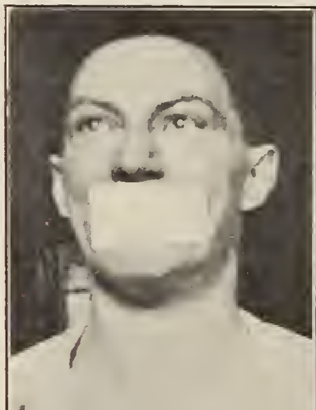

Fig. 3.

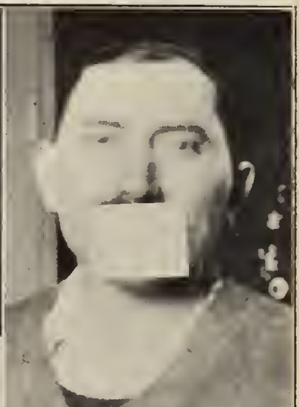

Fig. 4.

Fig. 3.—This patient was discharged cured four years ago, following a six months' nonsurgical management for early Graves's disease. There is complete restoration of subjective and objective health, with a gain of twenty-five pounds in weight.

Fig. 4.—This represents a patient who has been enjoying perfect health for ten years, following recovery from Graves's disease characterized by very large hyperplastic goitre, extreme exophthalmos, marked weakness and emaciation, and cardiac decompensation with acites of limbs and abdomen. After a year of nonsurgical management he was discharged recovered (February, 1911), and has been in perfect health since, as evidenced by this picture.

The frequency with which patients are met who, without goitre and without exophthalmos, otherwise prove to be rather advanced cases of Graves's disease, should warn us against an insufficiency in diagnostic efforts and procrastination in the institution of the necessary treatment. Presented with an atypical case of this sort, we must with reasonable certainty exclude such conditions as neurasthenia, hysteria, and the psychoses, nervous indigestion, pulmonary tuberculosis, diabetes mellitus, paroxysmal tachycardia, chorea, and other conditions characterized by one or more symptoms which simulate clearly or vaguely any of the manifestations commonly observed in Graves's disease. Occasionally, the very conditions we are endeavoring to exclude may coexist with Graves's disease. In such an event, the difficulties confronting the diagnostician are increased, and correct diagnosis may suffer further delay. However, by means of a careful history and a physical examination supplemented with a close observation of a week or two, the man of experience with these patients will usually diagnose his case.

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[1] As Figs. 1 to 4 inclusive represent some of the author's patients discharged years ago, there are no pictures illustrating their appearance during illness, since the author did not photograph his patients at that time. All photographs shown in this article are comparatively recent.

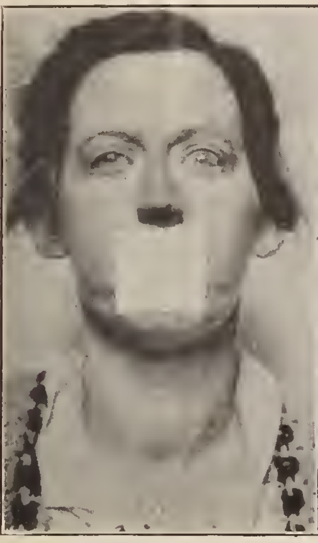

Fig. 5.

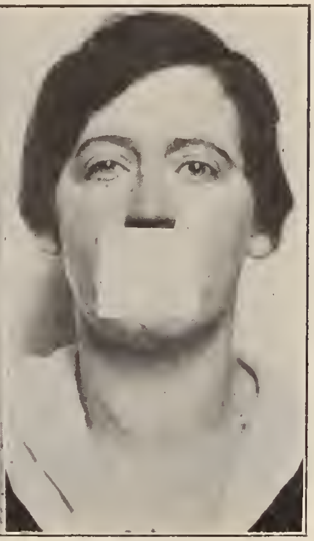

Fig. 6.

Fig. 5.—Exophthalmic goitre of one year's duration; unilateral exophthalmos.

Fig. 6.—Same patient as in Fig. 5, under treatment. After four months' nonsurgical management, patient is subjectively normal with a gain of twenty pounds, eyes and neck rapidly approaching normal.

Of the twelve to fifteen laboratory tests at the disposal of the clinician for the purpose of confirming the doubtful case of thyroid hyperactivity, the following are the most useful: (These tests do not discriminate between the types of toxic goitre.)

Adrenalin test of Dr. Goetsch.—This test depends upon the hypersensitiveness of these patients to hypodermic injections of adrenalin chloride solution. It is useful, but, as in the case of other tests, is not proof positive.

Hyperglycemia test.—This test depends upon the existence of hyperglycemia in the presence of thyrotoxemia. Here, too, we find much opportunity for error, as hyperglycemia may exist also in pituitary and pancreatic disease, and in other affections.

Basal metabolism test.—This is a method of calorimetry to determine the excess in these patients of catabolic over anabolic processes. While variations in basal metabolism may be observed in other affections, eminently in diabetes mellitus, pituitary disease, and under the influence of caffeine, it is in diseases of the thyroid that the greatest changes are observed. Thus, the differential diagnosis between toxic and nontoxic goitres and between early cases of Graves's disease (*formes frustes*) and the neuroses is rendered clearer than has heretofore been possible. By basal metabolism determination we not only ascertain the severity of a case of toxic goitre but we obtain some idea concerning its course. However, in order to be accurate, frequent readings are necessary, for the rate often varies from day to day, and a given reading is dependable only for the time the observation is made.

Quinine test.—In a recent contribution detailing observations in a series of cases, I described this test for toxic goitre, dependent upon the fact that these patients are relatively immune to the physiological effects of quinine. The technic of the test is as follows: The patient is given a dozen capsules, each containing ten grains of the hydrobromide of quinine, with instructions to take one capsule four times a day, to be washed down by an ample quantity of lukewarm water. By the time thirty, forty, or fifty grains have been taken by persons whose thyroid function is not excessive, there develops a sense of fullness in the head, impaired hearing with tinnitus, often dizziness and headache, and occasionally a feeling of slight gastric and bladder discomfort. Persons possessing a degree of susceptibility or idiosyncrasy will experience these symptoms after the first or second capsule, while those to a degree tolerant may not complain until sixty to one hundred grains have been taken. In the presence of thyroid hyperactivity, no symptoms develop from the daily administration of quinine hydrobromide even if given during a period of weeks or months; on the contrary, improvement in the syndrome is frequently observed. In these patients, though gastric disturbances may constitute an element in the primary complaints, the administration of these doses is likely

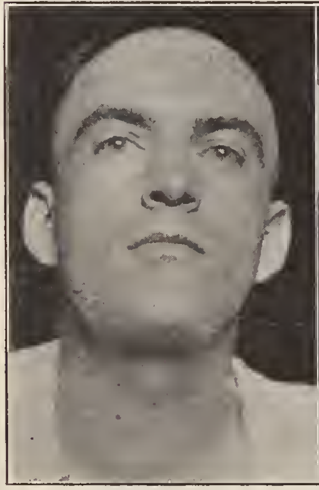

Fig. 7.

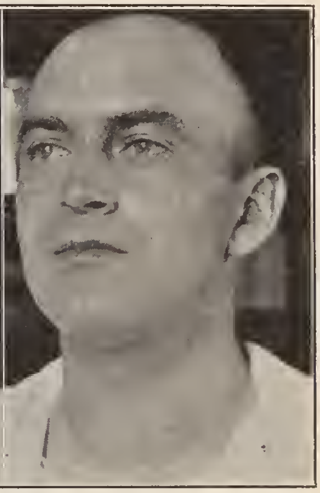

Fig. 8.

Fig. 7.—*Forme fruste* or early Graves's disease of six months' duration.

Fig. 8.—Same patient as in Fig. 7, after six months' nonsurgical treatment while at work. Complete restoration of subjective and objective health, with a gain of twenty-three pounds in weight.

occasionally to aggravate slightly the gastric condition. If combined with proper gastric sedatives, however, this objection is overcome. In my series of observations, the chances for error in this test do not exceed ten per cent.

It must be stated, however, that no test in itself should be considered a reliable guide in the diagnosis of hyperthyroidism or of Graves's disease. The clinician's diagnostic acumen should be regarded as the mainstay, and when in doubt laboratory procedures may be employed to assist in diagnostic deductions.

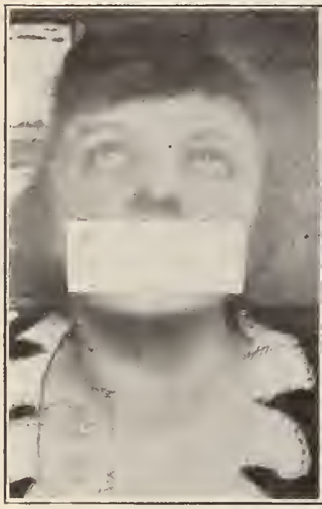
Fig. 9.

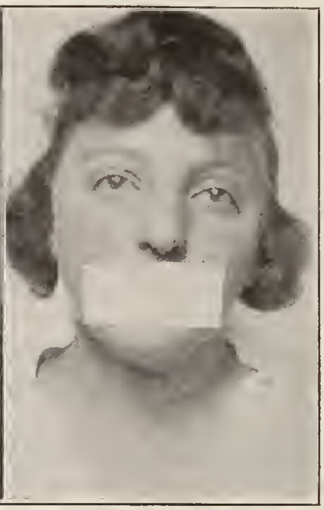
Fig. 10.

Fig. 9.—(Courtesy of Dr. S. A. Lowenburg). Typical Graves's disease of one year's duration; enlarged thyroid, beginning exophthalmos, weight one hundred and seven pounds.

Fig. 10.—Same patient as in Fig. 9. Complete recovery under seven months' nonsurgical management with a gain of thirty-five pounds in weight.

PRINCIPLES OF TREATMENT.

The treatment of thyroid hyperactivity divides itself into, a, treatment of toxic adenoma, and b, treatment of Graves's disease.

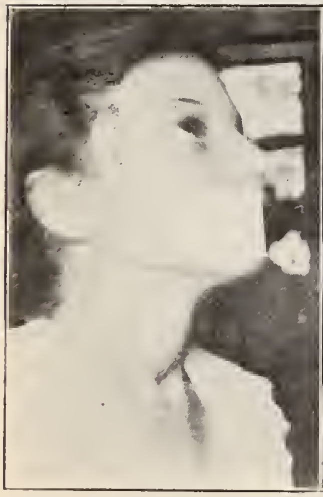
Fig. 13.

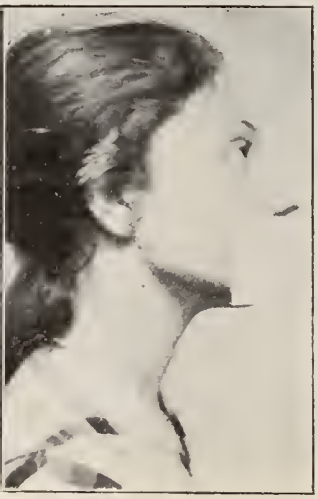
Fig. 14.

Fig. 13.—(Referred by Dr. Edith M. C. Weber). Exophthalmic goitre in a child of eleven, of one year's duration.

Fig. 14.—Recovery after six months' nonsurgical treatment; observe the difference in profile of the neck.

Toxic adenoma.—The treatment of toxic adenoma is best accomplished by the usual surgical procedure combined with judicious preoperative and postoperative efforts of the internist to render surgery safe on the one hand and convalescence satisfactory and complete on the other. If the adenoma is not large enough markedly to disfigure the individual or to cause pressure symptoms, a six months' to a year's nonsurgical treatment may succeed in eliminating the toxic element with the disappearance of the subjective and objective symptoms. But though in occasional instances the adenoma itself is reduced in size or disappears, it usually persists and may again flare up to toxicity. Unless there are contraindications to surgery, it is prudent to remove the adenoma as soon as the patient is in suitable condition for the ordeal. The discovery and elimination of infectious foci and other etiological factors should be the earnest endeavor of both surgeon and internist in the interests of permanent recovery. It is in this

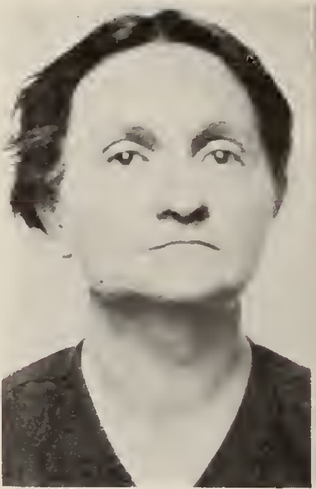
Fig. 11.

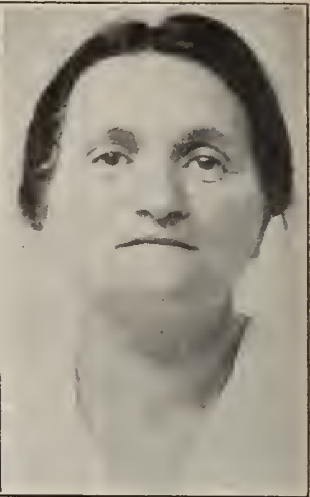
Fig. 12.

Fig. 11.—(Referred by Dr. A. E. Colcher). Exophthalmic goitre without exophthalmos, with marked emotional symptoms and extreme weakness.

Fig. 12.—Same patient as in Fig. 11, after six months' nonsurgical management. Complete recovery with a gain of thirty-eight pounds in weight.

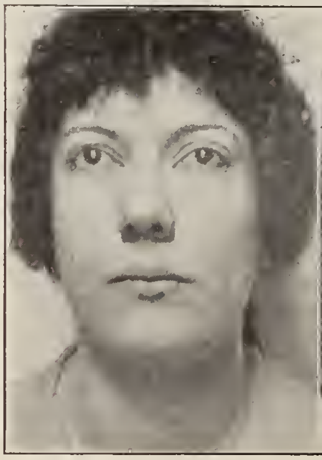
Fig. 15.

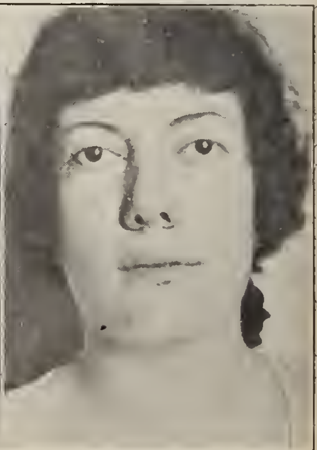
Fig. 16.

Fig. 15.—Exophthalmic goitre of ten years' duration with apparent pituitary involvement.

Fig. 16.—Same patient as in Fig. 15, after six months' nonsurgical treatment. Heart rate, eyes, and thyroid normal; patient soon to be discharged.

class of patients, often misdiagnosed as Graves's disease, that surgery achieves brilliant results. The reason for this is obvious. While the original or initial exciting cause of the symptoms of thyroid hyperactivity might have been almost anywhere in the body, the existing cause of toxic adenoma is a thyrotoxemia issuing from the adenoma. The removal of the mass plus the elimination of discoverable previously exciting causes means recovery in the great majority of patients.

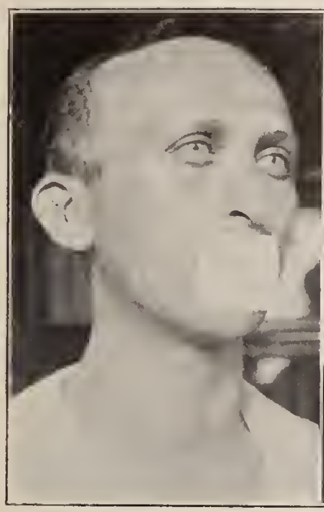
Fig. 17.

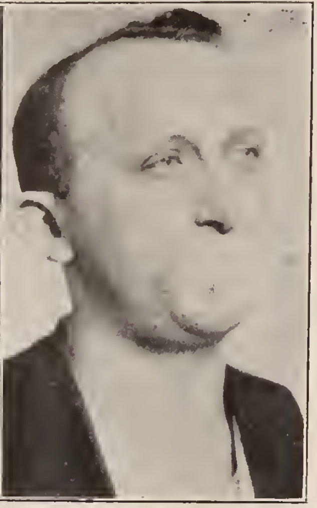
Fig. 18.

Fig. 17.—(Referred by Dr. George A. Ulrich). Graves's disease of four years' duration in a professional man. Extreme emaciation, weakness, very marked generalized tremor, rapid, irregular heart, and extreme emotionalism.

Fig. 18.—Same patient as in Fig. 17, after six months' nonsurgical management. Complete subjective and objective recovery with a gain of forty pounds in weight.

Graves's disease.—In principle, the treatment of Graves's disease is the direct opposite. While surgery is eminently successful in all forms of thyroid neoplasms including toxic adenoma, such is not the case in Graves's disease. Contrary to the facts in toxic adenoma, in Graves's disease the previous exciting causes and existing exciting causes of the syndrome are distal to the thyroid. Though thyroid dysfunction, usually hyperthyroidism, exists in Graves's disease, it is no more the main factor in the clinical picture than is the splenic hypertrophy of typhoid the main factor in typhoid fever. The hyperactivity of the thyroid, whether the organ is enlarged or not, and the enlarged spleen of typhoid are results, not causes of the respective affections. Each is a constituent of its respective disease, and it is just as irrational to apply surgery toward removal of the major portion of the thyroid in Graves's disease as it is to apply surgery to the enlarged spleen

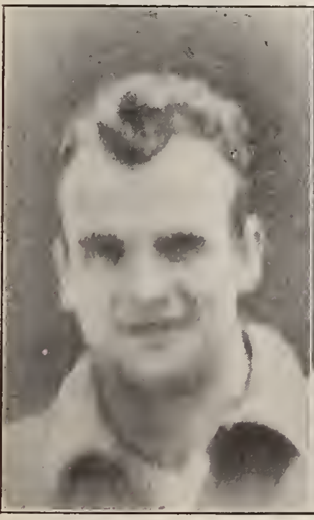
Fig. 21.

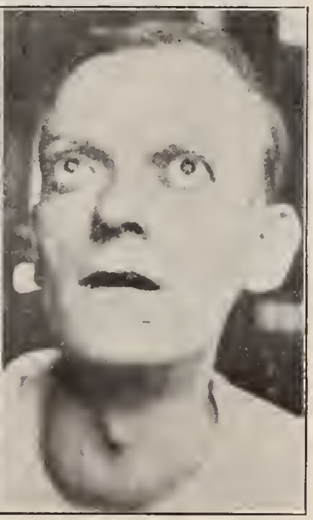
Fig. 22.

Fig. 21.—Five years prior to onset of exophthalmic goitre. (Enlargement from a tiny snapshot.)

Fig. 22.—Same person as in Fig. 21, five years later, with extremely malignant type of exophthalmic goitre of two years' duration. Very large, pulsating goitre, extreme exophthalmos, auricular fibrillation with pulse rate of 180, generalized choreiform twitchings, and on the verge of a major psychosis.

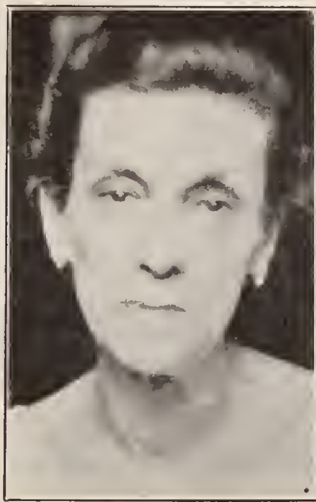
Fig. 19.

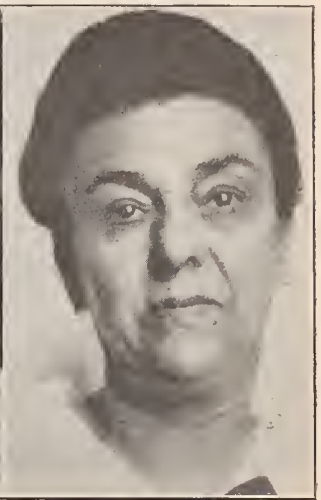
Fig. 20.

Fig. 19.—Exophthalmic goitre without exophthalmos, of two years' duration. Extreme weakness, rapid, irregular heart, marked restlessness.

Fig. 20.—Same patient as in Fig. 19 after seven months' nonsurgical treatment; complete recovery with a gain of forty-seven pounds in weight.

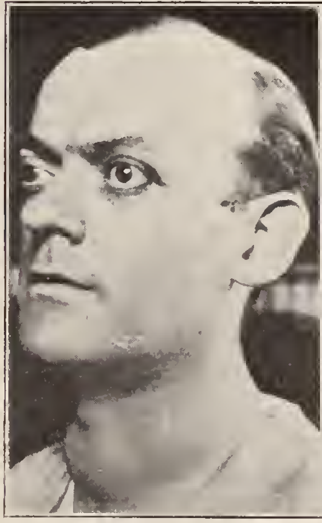
Fig. 23.

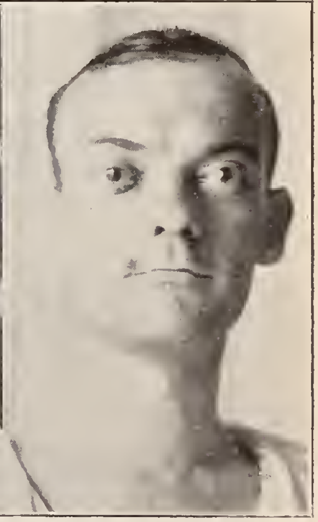
Fig. 24.

Fig. 23.—Same patient after twenty days' nonsurgical treatment. Note changed expression and gain of seventeen pounds in weight.

Fig. 24.—Same patient after six months' nonsurgical management; he is now back at work. There is a disappearance of goitre, eyes are normal, heart regular and normal, and a gain of thirty pounds in weight.

in typhoid. Except for the removal of discoverable infectious foci (which, in my experience, exists in about twenty per cent. of patients), surgery is unphilosophical and contraindicated, because Graves's disease is not goitre. The removal of this disease from the classification of goitre will do much to overcome the difference of opinion between surgeon and internist and lead to the consummation devoutly to be wished, namely, the rationalization of therapeusis. I base this conclusion upon the following premises:

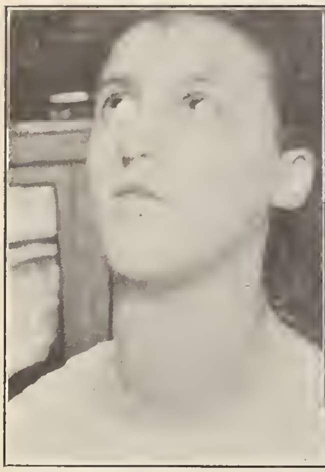

FIG. 25.

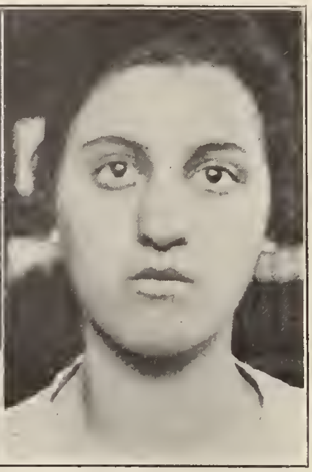

FIG. 26.

FIG. 25.—A girl of fifteen with a large colloid goitre of eight years' duration with beginning hyperthyroidism. Circumference of neck sixteen and a half inches.

FIG. 26.—Same patient as in Fig. 25, after four months' nonsurgical treatment. Circumference of neck fourteen and a half inches.

1. There is sufficient evidence to eliminate the theory that Graves's disease is due to hyperthyroidism. All known facts confirm the prevalent opinion that the etiology of the disease is distal to the thyroid and is of widespread origin.
2. The thyroid in Graves's disease is often normal in size and structure.
3. Thyroid hyperfunction is a mere constituent of the syndrome and seems to be a defensive reaction against toxins arising from the general dysfunction of the endocrine and vegetative nervous systems.
4. Patients frequently present symptoms of both hypothyroidism and hyperthyroidism concomitantly or alternately, which fact has led to Janney's appellation of dysthyroidism to this disease.
5. Patients submitting to thyroidectomy and in whom improvement is noted obtain temporary relief from a part of the syndrome only, that is, the hyperthyroidism, and not from Graves's disease. Soon the thyroid regenerates, there is a return of hyperthyroidism, and the clinical picture is again complete. Moreover, patients whose thyroids have been largely cut away rarely, if ever, reach their normal physical and mental standard.
6. The removal of any discoverable infectious foci and the institution of a properly outlined regimen of rest, diet, drugs, psychotherapy and other measures, applied by the experienced, individualizing internist to the sincerely cooperating patient, result in complete recovery in even moderately advanced cases, and this *without any local therapeutic attention directed to the thyroid.*

The aim of thyroidectomy is to break the vicious circle of the syndrome of Graves's disease by eradicating hyperthyroidism. The diagram shown in Fig. 29 represents the *rationale* of surgery. (This circle is not approved by the internist in explanation of the causal relationship in Graves's disease).

But the thyroid hyperactivity is a result, not the cause of the vicious circle, and the temporary relief obtained in a percentage of cases costs too dearly in terms of operative risk, the permanent scar, and the degree of perpetual invalidism which follows.

Granted, for the sake of argument, that breaking into the vicious circle mentioned above, conceived by the surgeon, is our goal, the internist in regarding thyroid hyperactivity as an effect, not the cause of the syndrome, breaks the circle by attacking the *causal* aspect, leaving the thyroid gland severely alone. If the necessary conditions obtain, recovery usually follows, including a restoration of the structure and functions of the thyroid gland.

Now, what are the principles of nonsurgical management of Graves's disease? There is no specific method of procedure simply because there is no specific etiology nor symptomatology characterizing the affection. Indeed, the chief characteristic of Graves's disease is its variability. All cases differ markedly, and though the four cardinal symptoms command our respect, they must not as a group be taken too seriously in a given patient. Thus we may note an absence of exophthalmos and of goitre; we may note a varying combination of hyperthyroidism and hypothyroidism; a varying combination of sympatheticotonia and vagotonia; in one patient there may be emphatic evidences of adrenal, in another gonadal, in still another pituitary, and again pancreatic or parathyroid involvement. One patient is still tolerably sane and sensible; another wavers, is obsessed with fixed ideas, or suffers from hallucination and delusions, is a nymphomaniac, or is about to merge into a major psychosis. We might continue for hours to enumerate variations in the clinical picture

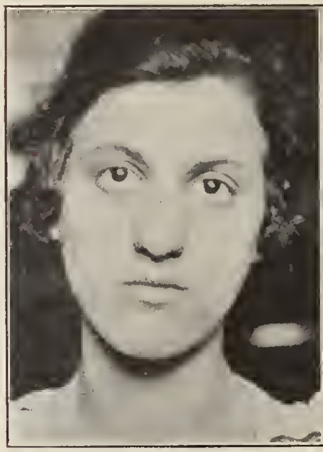

FIG. 27.

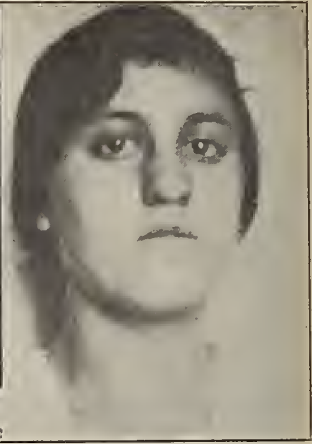

FIG. 28.

FIG. 27.—Same patient as in Fig. 25, after five months' nonsurgical treatment. Circumference of neck thirteen and a half inches.

FIG. 28.—Same patient as Fig. 25, after six months' nonsurgical treatment. Circumference of neck twelve and three quarter inches. Neck is entirely normal, with complete recovery from hyperthyroidism.

of Graves's disease, bearing more or less on the nature of treatment to be adopted in an individual case. Any treatment, to succeed, must coincide with individual cause, individual symptoms, and individual peculiarities and idiosyncrasies. Hence it is that the management of such a patient is one of the most difficult, if not the most difficult task in medicine. Hence it is that such a patient is often a burden to the general practitioner and a source of worriment even to the surgeon.

Individualization, then, is the basis upon which the therapeusis of the disease depends. The following are a few brief suggestions in treatment:

TREATMENT.

Elimination of discoverable etiological factors.—The mental and physical causes in each case must be ferreted out and removed, with or without the aid of relatives or friends, even if it requires hours of history taking; and a most painstaking physical examination, including the necessary laboratory analyses, should be made.

Rest.—Unless there is a serious heart lesion, the rest cure, socalled, is contraindicated in the average patient, as it rests neither mind nor body. A prolonged rest in bed makes for introspection, increases apprehensiveness, diminishes appetite, and reduces weight. The usual early or moderately advanced case does best on an eight or nine hours' sleep at night and a two hours' rest in bed after luncheon. The remaining hours are to be spent in any manner best suited to the individual case.

Diet.—The diet in general must be of nonflesh quality, but of very ample, I should say overample, quantity, free from irritants and stimulants. Food must be taken in specified quantities at stated intervals. Nausea, vomiting, indigestion, constipation, diarrhea, and glycosuria—each must be carefully managed with one point in view, that of increasing the food intake and the weight of the patient. It is my habit to give each patient or medical attendant a diet list stating in detail the quality, quantity, and the time of taking of the food constituting the three meals and three extra nourishments in the day's transactions.

Drugs.—It is in the consideration of drugs that the greatest degree of individualization is required. Here, indeed, "what is one man's meat is another man's poison." In each patient a drug or drugs may be found to yield favorable results, but no drug, not even quinine, may be regarded as a specific in all cases. Also, in no other disease is it so vital to know what not to give. Such substances as corpus luteum, suprarenal extract, posterior pituitary, pancreatic extract, and parathyroid, singly or in combination, are useful in certain patients. Thyroid should never be employed except when symptoms of hypothyroidism dominate the scene, and even then, it should be given very cautiously. The iodides, mercury, belladonna, ergot, veronal, luminal, ichthyol (internally), iron, arsenic—all have their field of usefulness. Bromides and the opiates are not to be resorted to. Spartein sulphate may be employed, but digitalis, excepting in convalescence, is harmful in this disease. There are many other drugs that might be employed in the presence of unusual indications.

Electrotherapy.—Electricity (and the same might be said of drugs) should never be regarded as a mainstay. Occasionally it may be employed for psychical effect. The only forms of electricity that may be regarded as useful supplements in treatment in a small percentage of cases are the static wave current over the thyroid gland and the röntgen rays. The x ray, in common with surgery, has for its purpose the reduction of the quantity of functionating thyroid, and at its best succeeds, as does surgery, temporarily to alleviate evidences of hyperthyroidism. Occasionally, for some mysterious reason, it renders the syndrome of Graves's disease more acute and, rarely, causes death. Not infrequently overdosing occurs, resulting (as is the case in the removal of too much thyroid by surgery) in myxedema. As a supplement to other nonsurgical measures, x ray treatment may be employed advantageously in patients where the thyroid hyperplasia is unusually great, but it must be borne in mind that underdosing, rather than sufficient dosing, is the safest. In general, I find it almost unnecessary to resort to measures of this sort, and in at least ninety per cent. of my patients no local therapeutic measures directed to the thyroid are employed.

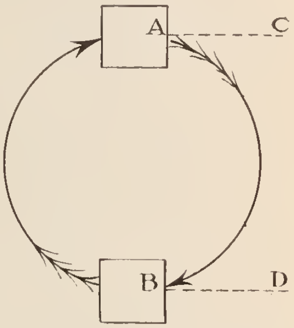

Fig. 29.—Surgery's conception of vicious circle of Graves's disease. A, thyroid hyperactivity; B, mental and physical phenomena; C, surgical method of approach; break vicious circle by thyroidectomy; D, nonsurgical method of approach; break vicious circle by elimination of mental and physical phenomena.

Psychotherapy.—If I were asked what I consider the most important element in the management of a patient suffering with Graves's disease, I would say psychotherapy, because first, in this disease there is an inherent mental instability requiring a painstaking adjustment without which all other measures are futile, and second, psychotherapy, aiming as it does at sincere cooperation on the part of the patient, is responsible for the harmonization of all the other measures and means employed in the attainment of our goal.

Frequently, it is necessary to interview the patient's relatives and friends in the interests of cooperative effort. Psychotherapy must include, in course of time, and again with an eye to individualization, the vocation and avocation of the patient.

PREREQUISITES TO RECOVERY.

In conclusion, I would state that there are four conditions which must obtain if we would achieve our goal. 1. The medical attendant must be properly equipped as diagnostician, therapist, and psychologist, in order properly to manage his patient. 2. The patient must still have a reasonable amount of recuperative power. 3. The patient must be tolerably sane. 4. The patient must be sincerely cooperative. In brief, the properly equipped internist after eliminating those who are moribund, the insane, and the noncooperative, should obtain approximately one hundred per cent. recoveries.

1431 Spruce Street.

The Interrelation of the Endocrines and the Vegetative Nervous System*

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Certain structural bodies designated by anatomists and physiologists as internal secretory glands have long been known to exist, but of their functional activities little has been revealed until recent years. With the advent of more exact methods of research, so much has been learned, in elucidating the functional values of these little organs, that many pages of physiology must be rewritten. The recent impetus which the study of the endocrines has received bids certain to effect results in revolutionizing the practice of medicine.

At the outset I wish to register a protest against the tendency already prevalent toward creating new specialists. Specialism is rampant among us and limitation of medical knowledge is a bad thing. Personally, I object to being stigmatized as an endocrinologist. The endocrines are functionally basic to all principles of physiology, in fact, endocrinology is physiology, and no physician or surgeon can qualify adequately in any phase of medical science who is failing in knowledge of this subject. We must all be endocrinologists to practise successfully the art of healing which is our paramount function.

Those of us who limit our work exclusively to diseases of the nervous system are designated neurologists, psychiatrists and alienists, inferring, falsely, that the functions of the brain, spinal cord and peripheral nervous system are all with which we are concerned.

The functional activity of every organ in the body is dependent upon the integrity of the nervous system and in turn its normal action is reciprocal to that of all other organs. The successful neurologist must be versed in all phases of body physiology. Specialism too frequently creates tubular vision, a narrowing of perspective and limitation of study to that special part of the anatomy embraced by the particular specialty. The successful diagnostician must know how to interpret disturbed physiology, which is quite impossible without a thorough knowledge of the functions of the endocrine glands.

Our present meagre knowledge enables us to elucidate many morbid clinical entities which have challenged, for years, our best efforts, and potent therapeutic means are now in the possession of every practitioner of medicine. Many of the morbid states resulting from disturbances of function of the glands of internal secretion are familiar to even the casual observer, e. g., Basedow's disease, cretinism, myxedema, giantism, acromegaly, distrophia adiposogenitalis, eunuchoidism, infantilism, and Addison's disease. These familiar states in the gross development of the clinical picture are readily recognized and we now possess definite knowledge of the exciting or inhibiting glandular dysfunctions creative of these structural and physiological disturbances. It is with the more subtle expressions of dysfunction, which are most frequently overlooked, that I wish to engage your attention.

It is well to recall that the normal physiology of every person is under the dominance of one or more endocrine determinants, which are expressed in his structural, physiological and psychical makeup. Thus we attempt to designate persons in terms of glandular types, recognizing thyroidal, pituitary, suprarenal, thymic and gonadal types; many are mixed types and are designated thyroadrenal, pituitoadrenal, etc. "Studies clinically have proved that certain physiological and structural markings are constant to certain glandular types, and by the physical objective examination alone, without other information, we can make an accurate designation." (1)

I omit the classification of the other types incident to glandular dysfunction, which have been mentioned in previous papers, and pass on to a consideration of the interrelation of the endocrines and the vegetative nervous system. The internal secretory glands are vegetative organs and their function is to a degree regulated by the nervous system, while on the other hand the dominance of these glands over the nervous system is indisputable. This is particularly evident as displayed through psychical or mental functions. "The alterations in character that are almost always associated with the development of Basedow's disease, such as psychical irritability and frequently a manic-euphoristic attitude; the apathy and lack of interest of the myxedematous; the characteristic quiet mental attitude in hypophyseal dystrophy; the feeling of mental want of strength in those suffering from Addison's disease; the depressive attitude of the tetany patient and finally, the profound influence that the ripening of the sexual glands at the time of puberty or the loss of function of the sexual glands in castrates exercises on the psyche." (2)

A brief and very superficial description of the vegetative nervous system is essential in order that its correlation of function with the endocrines may be understood. There are two great subdivisions of this system anatomically distinct, but physiologically antagonistic and normally in counterbalance. The two divisions are the sympathetic and autonomic or parasympathetic or vagus. These both innervate the nonstriped muscles of the body, the various endocrine as well as duct glands, the viscera, heart, bloodvessels, and genital organs. To quote from Stewart: "It is an outgrowth from the cerebrospinal system with which it remains connected by afferent and efferent fibres. A number of specialized vegetative nerve cells remain within the cerebrospinal axis, thereby accounting for the occurrence of vegetative phenomena in certain central diseases. No fibre of the system passes from the cerebrospinal axis to an involuntary end organ without the interposition of a ganglion cell in its course. The nerve fibres passing from the cerebrospinal cells are termed preganglionic; those passing from the ganglion cells to the viscera are postganglionic. The sympathetic proper is made up of two chains of ganglionated cords, like strings of beads, one on each side of the vertebral column, extending from the base of the skull to the coccyx. In the thoracic, lumbar, and sacral regions, the ganglia correspond in number to the spinal nerve roots. In the cervical region, instead of eight ganglia, there are only three, designated superior, middle, and inferior. These cervical ganglia are connected with the spinal cord, not through the cervical roots, but through the first and second thoracic roots."

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The autonomic system or the socalled extended vagus consists of nerve fibres with ganglia located more peripherally. Those fibres from the higher levels called the cranial autonomic arise from the midbrain and pass along the oculomotor nerve to the ciliary ganglion, thence to the iris and ciliary muscle. The cervical autonomic arises from the medulla and, through the nervus intermedius, glossopharyngeal and vagus, fibres pass on to the sphenopalatine, otic and submaxillary ganglia. The sacral autonomic fibres emerge from the cord through the second, third and fourth sacral nerves and supply the descending colon, sigmoid, rectum, bladder, urethra and genital organs.

"The vegetative system comprises three great plexuses, the cardiac, the solar, and the hypogastric. These receive fibres from the autonomic and sympathetic as well as from the cerebrospinal nerves. It is now quite generally conceded that the endocrine system is, in part at least, structurally and functionally identical with the vegetative nervous system and influences the function of the vegetative nervous system by the hormones created by its glands." (3)

The suprarenal glands are definitely a part of the sympathetic and their secretion, adrenalin, is the activating agent which stimulates the entire chromaffin system to functional activity. The paraganglion cells of the sympathetic all secrete adrenalin from the cells of the suprarenal medulla contained in them, and are distributed even along the course of the sympathetic nerve fibres. Thus, the suprarenals are a part of the nervous system. There is also reason deduced from clinical evidence to believe that the posterior or nervous portion of the pituitary gland dominates to a degree the autonomic portion of the vegetative nervous system. The interrelationship of all internal secretory glands having been conclusively established, we are able to see how glandular dysfunction may be expressed by an effort of conpensatory action through the more dominant glandular elements of the vegetative system.

"A rough simile illustrating my conception of the primary dominance of the endocrines, is to consider the hormones of the vegetative glands, the activating agent or the fire which keeps up the steam or nervous energy, socalled. The nervous system, structurally, is the dynamo which runs the human machine. The chemical composition of the individual nerve cell, and collectively of the nervous system, is analogous to the water in the boiler, which, generated into steam, makes the machinery go. If the supply of water is deficient (nutritional nerve exhaustion) the energy is lessened, as is likewise the case if the fires are low (glandular exhaustion). If there is too much fire (hypersecretion) and too much steam, the boiler will burst and a physical and psychical explosion will occur. The extremes of hypofunction and hyperfunction are thus expressed.

"The psyche, that all powerful intangible reflector of physiochemical function, is maintained in proper balance through the normal action of this mechanism just described. Its responses, in so called psychic reactions, are dependent upon this all dominant endocrine function. As a buffer to these vital functions, it responds in varying degrees as influenced by experiences based upon instinct and memory complexes, and the socalled shock reactions are accordingly expressed and reflected by symptomatic evidences. That large group of patients generally misunderstood and frequently classed in civil life as neurasthenics, psychasthenics, hysterics, cyclothymics, and hypochondriacs, is now capable of an intelligent analysis and rational therapy, if one will concede that these are the victims of an endocrine asthenia."

That to which we have loosely referred as body resistance is nothing more than proper endocrine balance; the many etiological factors tending to lower socalled resistance, such as fatigue from overwork, both physical and mental, the toxemias —both acute and chronic, the anaphylactic reactions and the shock reactions following anesthesias, as well as psychic and physical traumata, are all creative of an endocrinasthenia.

It is a common experience for most of us to examine a patient after listening to a description of complaints, only to find no evidence of any organic disease or any tangible etiological factors to account for the symptoms. These are the patients by whom the average physician is bored and whose symptoms, which are chiefly subjective, are frequently considered purely imaginary. Socalled imaginary symptoms are themselves the reflection of perverted function, morbidly expressed through the psyche.

It was with this type of patient commonly referred to as the neurotic that my interest in endocrine function was first aroused.

With the Freudian school, of which at one time I was an ardent disciple, I was thoroughly in accord in attributing all neuroses to underlying psychic traumata, usually of sexual origin, to repressions, and their consequent maladjustments. In other words, the psyche harbored the hidden etiology as repressed complexes to which all somatic symptoms were correlated and to release the subconscious content by psychoanalysis was to effect a cure.

Prolonged observation has convinced me that the elimination of the psychic irritant is only a small part of the problem. The recognition of a physical basis of primary importance, as revealed by disturbed endocrine function elucidates the symptomatology of these patients.

The continued assault of the psychic irritant will not express its symptomatology until it has been sufficient to undermine the balance of the endocrines and after the removal of the psychic irritant, regardless of the method, the return to normal health will not occur until the endocrine readjustment is effected.

The aggregate of life's experiences is registered indelibly in the subconscious, and to the memory of morbid experiences the intensity of reaction varies in each of us, according to our psychophysical resistance, either at the time of the physical or mental trauma or subsequently. This was admirably illustrated during the late war. The profoundly irritant effect of the accumulated psychical and physical traumata were not expressed as socalled war neuroses until the endocrine exhaustion occurred, thus lowering the psychic threshold and allowing fears, anxieties and obsessions to dominate the psyche, thus overflowing the lowered barriers of control.

To analyze the psychic content enlightens the patient as to the psychology of his mental complex and thus relieves his mental tension by creating a knowledge of the nature of the mental symptom, but it does not enable him to effect control of his psychic processes and hold his obsessions in abeyance. The vegetative nervous system may schematically be likened to a finely poised balance beam resting on a pivotal support suspended from thyroid to ovary in the female or testicle in the male, the plane of the pivotal point being heightened or lowered as hyperfunction or hypofunction of these reciprocal glands may occur.

"The left half of this visualized balance is the sympathetic portion of the vegetative nervous system, and the right half the autonomic or extended vagus, this schematic right and left subdivision peculiarly exists in the clinical expression of vegetative dominance in the production of right and left sided symptomatology. This is an observation of remarkable clinical interest, proved beyond all possibility of being mere chance or coincidence. By endocrine interpretation as reflected in the structural makeup of individuals, right and left sided symptomatology and pathology may be determined. It is definitely known, as previously stated, that the sympathetic portion of the vegetative nervous system is activated and maintained in balance by adrenalin, the hormone of the suprarenals, while the autonomic portion, although not accepted generally, I believe from clinical observation is dominated by the posterior or nervous portion of the pituitary, inclusive of the infundibulum. (Vagotonic effect of pituitrin on intestine and uterus.)" (4).

All exhaustion reactions are expressed mainly through the suprarenal glands creating a state of hypoadrenia with a resulting vagotonia, which is the condition invariably noted in socalled neurasthenic, psychasthenic and hysteroid states.

The balance of the vegetative nervous system is physiologically disturbed in states of normal health, by transient irritants which may be psychical, chemical or physical. The demands incident to stress will excite the suprarenals either directly or indirectly through the thyroid and a sympatheticotonia results. Exhaustion from prolonged overaction of suprarenals results in a depression of function, the sympathetic tonus is lowered below normal and a vagotonia is created. These states are transient in all persons from day to day, but when the imbalance exists over a long period of time, then the formerly transient subjective symptoms become most disturbing to the patient.

The symptoms produced through dominance of either sympathetic or vagus are of directly opposite nature. Symptoms of endocrine dysfunction are expressed by the vegetative nervous system segmentally in the spinal cord through the cephalic, thoracic and pelvic portions of its distribution, thus giving rise to the varied localized disturbances of visceral function.

Such commonly observed symptoms as the following may occur, depending upon whether the vagus or sympathetic is in dominance:

In the cephalic region there may be (5) "myosis or mydriasis, widened or narrowed lid slits, infrequent winking, exophthalmus or enophthalmus, salivation or dry mouth, cephalalgia of vasomotor origin, e. g., migraine.

"In the respiratory tract there may be laryngismus, bronchiospasm or asthmatic attacks. In the circulatory system there may be tachycardia or bradycardia, vasomotor angina, changes in blood pressure, peripheral hyperemias and ischemias. In the digestive tract esophagismus, cardiospasm, pylorospasm, achylia, gastrosuccorrhea, atonic or spastic constipation, spasticity or atony in various intestinal segments. In the genitourinary system there may be incontinence or retention of urine, enuresis and tenesmus and ureteral spasm, disturbances of libido, dysmenorrhea and menorrhagia. In the cutaneous system there may be gooseflesh, hyperidrosis or anidrosis, pallor, flushing, dermographia," etc. These various symptoms are important in making an interpretation of endocrine dysfunction as they are definitely correlated to either a vagotonia or sympatheticotonia.

All states of hypoadrenia, regardless of etiology, lower the sympathetic tone and create a condition of vagotonia, which may be segmentally expressed as a local vagotonia or evident as a general vagotonia when all segments are affected. Hyperadrenia produces a sympatheticotonia. Hypopituitarism produces a lowered vagal tone with resulting sympatheticotonia, while hyperpituitarism creates a vagotonia.

The endocrines in their intimate interrelation of function display various compensatory and inhibitory reactions; an overactive thyroid is invariably compensating for a deficient suprarenal balance or a gonadal dysfunction, or it may be due to the protective effect of increased oxidation demanded in Nature's effort to contend with the invasion of toxines. Hyperthyroidism primarily stimulates the adrenals to the production of a sympatheticotonia but after a time the thyroid becomes exhausted, a thyrotoxicosis is produced by a perversion of its secretion and the burden is too great for the already overtaxed adrenals, which causes a lowering of sympathetic tone with a resulting vagotonia.

The pituitary is a well known synergist to the gonads. This is particularly well expressed in the female at every menstrual period when there is an associated pituitary activity frequently occurring in compensation for gonadal fatigue, and causing transient swelling of the pituitary to the degree of creating intracranial pressure symptoms, e. g., pituitary headache, visual disturbances from pressure on optic nerves, nausea and vomiting and either general or pelvic vagotonic symptoms, the latter being characterized as dysmenorrhea. I have seen acromegaly produced by this compensatory hyperfunction of the pituitary gland when its anterior lobe has been activated by continued effort on the part of the pituitary to aid exhausted ovaries or to compensate for their total loss by surgery.

Selective compensatory stress reactions are expressed first through the gland which dominates the individual's physiology and this is always objectively evident in the structural type of that person. In thyroidal types, thyroid compensatory effort is dominant. In suprarenal types and pituitary types such compensation effort is primarily evident through those glands respectively. In mixed types the predominant gland is the one which responds first. In these compensatory stress reactions the gland which first responds bears the brunt of the load and is the first exhausted with sequential hyperactivity occurring in the associated structural determinant. Prolonged stress leads to exhaustion and thus the entire chain may slump.

By careful observation and analysis of symptoms, both subjective and objective, it becomes a relatively simple matter to interpret endocrine dysfunction. In supplying the deficient gland substances by intelligent therapeutic methods one may promptly create an endocrine balance and eradicate annoying symptoms in a manner that is frequently uncanny and most spectacular, as well as quite impossible by any other therapeutic means at our disposal.

REFERENCES.

1. Garretson: Endocrinology in Daily Practice, New York Medical Journal, February 7, 1920.
2. *Idem:* Dominance of Endocrines, *Ibid*, May 17, 1919.
3. *Idem: Ibid.*
4. *Idem:* The Endocrines as Factors in the Causation and Treatment of Dysmenorrhea, *Ibid*, July 6, 1921.
5. Orbison: The Vegetative Nervous System, *Ibid*, September 29, 1917.

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The Suprarenals in Asthma

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The excitability of different nerve centres shows considerable individual variations. This is shown by the variability of the pupil reflexes, skin reflexes, and deep reflexes. I believe that asthma is due to a condition which is generally, or perhaps always, inborn and often inherited, in which the bronchomotor part of the vagus nucleus is more active than in the average man, and consequently responds in an exaggerated manner to blood borne irritants and to peripheral and psychical stimuli. In some cases it is very slightly so; the individual may then never have an attack of asthma in his life or, as in several of my patients, only a few attacks under very special circumstances. In other cases it is very hypersensitive, and the asthma is more severe and constant. The overactivity of the bronchoconstrictor fibres of the vagus is kept in check by the bronchodilator activity of the sympathic nerve fibres to the bronchial muscles, which is largely dependent on the constant secretion of adrenalin.

Physical and mental fatigue is a common cause of asthma. Many asthmatics are always ill when they overwork, but recover at once on a holiday. Asthma is always worse in the evening than in the morning, and patients can eat a large breakfast without any unpleasant symptoms resulting; but the smallest dinner, consisting perhaps of no articles of diet which cannot be taken with impunity at breakfast, is followed at once by wheeziness. And even if no food is eaten at night, asthma may develop, though less severely. If the patient sleeps in the afternoon he is often asthmatic in the evening, or if he sleeps just before dinner he may be able to eat much more than would otherwise have been possible. As asthma is caused by overactivity of the bronchial muscles, it might have been expected that fatigue would result in their relaxation, and consequently in the relief of the asthma. But physical fatigue does not seem to influence involuntary muscles, and certainly it does not lead to relaxation of the bronchial spasm. It is well known that extreme fatigue leads to marked exhaustion changes in the suprarenal gland. It is quite possible that the fatigue of each day is sufficient to cause a slighter degree of similar changes. The smallest diminution in the secretion of adrenalin would allow the overactivity of the vagal bronchomotor centre to have greater freedom of action, and asthma would result. These considerations appear to afford an adequate explanation of the production of asthma by fatigue.

Toxic idiopathies or hypersensitiveness to certain proteins, according to certain French authors, depend in part upon the fact that the proteins have the effect of depressing the activity of the suprarenal glands. This effect may manifest itself in depression of one or all of their normal activities, the chief being in connection with the bloodvessels, the alimentary canal, and the bronchi. Acute and severe anaphylaxis produced by large doses of serum injected into an individual sensitized by a previous injection of serum affects all three. More commonly only those functions for the particular individual are affected.

Thus an asthmatic will have an attack of asthma and a man with a sensitive vasomotor system will manifest urticaria or other vasomotor disturbances in the skin. A man who tends to have gastrointestinal attacks, owing to the abnormal irritability of his digestive tract, will vomit and have diarrhea and abdominal cramp, the result of exaggerated peristalsis and relaxation of the cardiac, pyloric, and ileocecal sphincters; this explains idiosyncrasies to shellfish, eggs, and certain other foods, which are manifested by acute digestive disturbances. In some cases an attack of asthma will be accompanied by vasomotor changes, or alternate with them, or will be accompanied by an abdominal attack. In one of my patients an attack of diarrhea is always preceded by a feeling of tightness in the chest, which may develop into definite asthma while the diarrhea lasts, finally disappearing with it. Lastly, in some cases, the idiopathy is manifested in an attack of hay fever.

It is a familiar fact that a fright may relieve an attack of asthma. A man in the middle of a severe attack was driving a motor down hill when the brake refused to act; he was in immediate danger of dashing into a wall which faced him at the bottom of the hill, but at the very last moment he succeeded in regaining control of the car; when he drew up he found that he was breathing with perfect freedom. This was probably due to the stimulation of his sympathetic nervous system and adrenalin secretion caused by the fright. The stimulation of suprarenal secretion by asphyxia explains the spontaneous relief an asthmatic experiences if he continues walking after it has brought on a moderate degree of dyspnea. For this reason asthmatics should be encouraged to persevere with exercise even if they feel very short of breath during the first quarter of an hour. Finally, the extraordinarily rapid effect of adrenalin injections in bringing relief in an acute attack of asthma in many individuals can best be explained by this theory. The dose required is less than that required to produce general symptoms, such as a rise of blood pressure and a rapid pulse, because adrenalin first acts upon any organ which is too much under vagal control at the moment.

An attack of asthma can, in fact, be cut short by the subcutaneous injection of adrenalin more rapidly than by any other method. The most efficacious dose is much smaller than that generally given. In many cases a single minim of one in one thousand adrenalin chloride is enough, more than two minims being rarely required. But the injection should be given at the beginning of an attack, directly a patient wakes in the night, for instance, and not half an hour or an hour later when it has reached its full development. The relief is so immediate that the patient often falls asleep within five minutes of waking in an attack. Such small doses give rise to no unpleasant sensations, such as frequently follow the injection of three or more minims. I have known many patients who have had to discontinue the use of the drug, because they preferred asthma to the extremely disagreeable, and occasionally even alarming, symptoms caused by the injections. In every case the dose proved to have been excessive, and one or two minims were found to have the desired effect on the asthma without causing the slightest malaise. Consequently, the treatment can be continued for long periods without any fear of ultimately causing arteriosclerosis. It is the only form of injection which a patient should be allowed to use on himself; if he has to depend on some one else giving it, he will rarely receive it at the right moment.

Anaphylaxis and the Endocrines

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The physician who makes a persistent study of the internal secretions and organotherapy soon finds himself developing an interest in the phenomenon known as anaphylaxis, or protein sensitization. Undoubtedly this peculiar reaction of the organism has a closer relationship to the ductless glands and their hormones than has been appreciated heretofore, and some personal observations may be related here to further an interest in the study and appreciation of the importance of these relations.

Protein poisoning, like any other toxemia, necessarily must invariably involve the detoxicating mechanism, and since this undoubtedly is presided over by the thyroid and allied endocrine glands, whenever we run across a person who is sensitive to certain proteids, naturally we become interested in the functional capacity of these regulators of metabolism. For example, some physicians now believe that certain forms of high blood pressure are examples of the anaphylaxislike reaction of the body to certain protein toxins, and, if this is the case, the study and treatment of hypertension should involve the search for these poisons and their removal as far as possible, as well as the encouragement of the overburdened endocrine organs, or, on the other hand, the encouragement of the opposing organs which maintain the socalled hormone balance.

As we are confronted with persons with peculiar sensitization to various foods, it is surprising how many of them also have some endocrine disturbance. The reverse is equally true. Asthma, which, to my way of thinking, many times is largely a matter of anaphylaxis, is commonly associated with dyscrinism involving sometimes the thymus, sometimes the pituitary, and at other times the adrenals.

The influence that protein poisoning has upon the endocrine glands is of great importance. When a patient has an anaphylactic reaction he is virtually suffering from an acute protein poisoning, and, as in other poisonings with varied origins, one expects the natural defense of the body to poisons to be involved. Consequently there is a very large adrenal side to conditions of this kind. We find that not infrequently hypoadrenia accompanies or follows anaphylaxis; and the regulation of this adrenal insufficiency often helps the let down resulting from the anaphylaxis. We also find occasional hints in therapeutic literature indicating that adrenal therapy, or, more correctly, adrenalin therapy, is used to modify or prevent the nitroid crises which accompany salvarsan injections (personally, I believe that the trouble is not entirely arsenical but rather the result of protein products broken up and released into the organism by the severe arsenic toxemia and a consequent protein poisoning plus arsenic poisoning). Again, adrenalin has been used with good success in urticaria which, as we know, is one of the manifestations of serum sickness, anaphylaxis, and other evidences of protein poisoning.

The condition known as status lymphaticus and its unfortunate outcome—thymus death—always has seemed to me akin to anaphylaxis, and if so, dyscrinism is once more related to this phenomenon for the thymus is believed to be an endocrine organ. The socalled serum sickness and the occasional deaths of children following serum treatment, seem to be in the same category and we know, at least, that in some patients dying under these circumstances are found at autopsy to have had thymus enlargement, status lymphaticus and the resulting disorganization.

For some years I have been studying epilepsy from the viewpoint of the ductless glands. Quite a good many hints in our experience indicate that there may be some anaphylactic aspect to the epileptic manifestations. For example: I recall a case where there was a bad postabortion infection. The endocrine balance was sadly deranged, and this patient from that time began to have increasingly severe epileptic seizures. It was believed that this particular epilepsy was a toxemia (and the consensus of opinion emphasizes the fact that if it is not exactly a condition of poisoning, it is seriously aggravated by all forms of toxemia), either brought about by or aggravated by the dysovarism. Regulation of this condition not merely changed the obvious menstrual irregularities, but disposed of the associated epilepsy; in other words, there was reestablished a hormone balance favoring the disposal of the toxemia which brought about the epilepsy.

Again, the matter of the nausea and vomiting of pregnancy may be considered from the point of view of anaphylaxis. It is well known that the discomforts of the earlier months of pregnancy are due to a toxemia, and the attitude of those who believe that this toxemia is connected with the production by the placenta of certain protein substances to which the body reacts unfavorably, seems to have been substantiated by much clinical experience. But the interesting point is that when a patient who is presumed to be sensitive to these placental proteins is fed placenta substance, and an attempt is made to increase the immunity of the body to them, there shortly ensues in a generous proportion of cases a tolerance to the toxemia which puts an end to the vomiting no matter how serious it might have been. (It is interesting to note how frequently persons with an increased tendency to the toxemia of pregnancy will tell of difficulties that they have in connection with eating strawberries, or shell fish, or eggs. The same is true in certain cases of asthma.)

In my experience with endocrine therapy I occasionally encounter a patient whose clinical findings indicate the necessity for certain glandular remedies, and who, after such therapy has been inaugurated, reacts unfavorably to the extracts, and, despite every effort to cover up the product, find that they cannot take them at all. They are nauseated; they break out into a rash; they suffer from sympatheticotonus, i. e., their sympathetic system seems to be considerably more on edge than usual, and in many ways they discover that they react unfavorably to the remedy. Fortunately, such patients are few and far between. I have tried to get figures, and imagine one in three thousand is not far from being correct. In other words, these patients are like those unfortunates who cannot eat strawberries or in whom there is an unpleasant reaction to other special foods already mentioned, and, interestingly enough, often these persons with idiosyncrasies to glandular extracts, already have discovered a similar intolerance to other foods. I have repeatedly attempted to get around this difficulty, and while in some cases I have succeeded in increasing the tolerance, in others I have failed absolutely, merely because no matter how small the dose, or how apparently effectually it was hidden, the patient would immediately assure me that they were having the same series of troubles which initiated the investigation along these lines.

A fertile field of study in protein sensitization and organotherapy is the development of a means whereby we can control those reactions of the body of an anaphylactic character which either are causing disease, as asthma, urticaria, nausea and vomiting, and other conditions, or are interfering with our well meant attempts to modify various dyscrinisms by means of the administration of organotherapeutic proteins.

The subject is still in a formative stage, but some suggestive conclusions may be made with advantage:

1. Protein metabolism is related to the internal secretions; hence, disturbances in the routine of protein metabolism may be connected with a disturbed endocrine function.

2. Anaphylaxis, or protein sensitization, may involve the endocrine glands, and a part of the reaction connected with these idiosyncrasies may involve the ductless glands.

3. Hypoadrenia of anaphylactic origin needs to be treated like adrenal insufficiency of any other toxic origin.

4. Occasionally, protein sensitization may be overcome by the establishment of an immunity, as is routinely done in the treatment of hydrophobia or the administration of bacterial vaccines. In vomiting of pregnancy, placenta substance administered over a period seems to favor an immunity to the placental proteins and a control of toxic irritability.

5. Occasionally, organotherapeutic measures bring about an anaphylactic reaction, particularly in patients already sensitive to other food proteins.

6. Whenever a clinical hint attracts attention to protein sensitization, the endocrines should be studied and brought into the matter both from the viewpoint of diagnosis as well as treatment.

The Incidence of Syphilis in Hypothyroidism and Myxedema in Children*

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We are at present only at the threshold of endocrine knowledge and are therefore very much in ignorance of what lies beyond it. We have learned to recognize and classify some of the disorders of the endocrine system with more or less certainty in a few conditions and with more or less conjecture in many others. Even though the thyroid gland is the one with which we are most familiar, we have not as yet arrived at the point where we are able to state with any degree of certainty why the changes in this gland should take place or what condition or conditions are fundamentally at the bottom of it all. In other words, what causes the various deviations from the normal cell structure and cell metabolism so as to bring about either an increased or a decreased secretion? This is one of the conditions where there has been more conjecture than fact. And as there is always that universal tendency to lay at the door of syphilis the causation of every disorder of obscure or unknown etiology, it is not at all surprising to have some clinicians advance the theory that syphilis to a great extent is the underlying etiological factor in the production of both hyperthyroidism and hypothyroidism. Remembering the varied ravages of the spirocheta pallida on practically every organ in the body, it is not unreasonable to expect that this scavenger may and can strike the thyroid as well, producing a disordered secretion.

There are several instances in the literature of a hypothyroidism which was probably produced by a syphilitic infection as both conditions were coexisting and disappeared simultaneously under thyroid and antisyphilitic treatment.

Pentagna (1) examined 115 cases of various endocrine disturbances observed in the Naples Clinic and found that in forty-six per cent. syphilis was present either in the patient or in the parental anamnesis.

Albadalijo (2) feels that syphilis produces lesions of the endocrine glands. He thinks that just as the adrenals are sensitive to tuberculous infection, so are the thyroid and hypophysis sensitive to syphilis. He describes two cases of hypothyroidism in syphilitics.

Hazen (3) quotes two cases in adults where antisyphilitic treatment cured myxedema in known syphilitics. One was Kohler's case of a woman of forty-eight who had a tumor of the thyroid which disappeared under iodine treatment. Myxedematous symptoms which were present also disappeared. The second case was reported by Pospelow.

Harrower (4) refers to cases by Korczynski, Maase, Casta and de Moraes and Pernambuco. With the exception of Korczynski's, all of these were in either adolescents or adults. His case was in a child in whom inherited syphilis seemed to have impaired the functioning of the thyroid, hypophysis, ovaries and blood producing organs. The child was a mental defective. There was a slight improvement on thyroid medication.

Bates (5) reported a case of a young man in whom hypothyroidism had developed following an acquired syphilis. Hertoghe also stresses the importance of syphilis as an etiological factor in the production of hypothyroidism.

Pentagna (1) contends that syphilis may be an important etiological factor in determining endocrine function. He interprets the influence of lues as not being a direct luetic manifestation but rather as due to the action of the syphilitic toxins during embryonal life, producing alterations in the endocrine gland which later in life manifest themselves as a dysfunction. The contentions of other supporters of syphilis as a causative factor do not seem to substantiate this view, but stress the supposition that lues can influence every organ in the body, including the thyroid with the production of an interstitial thyroiditis.

That syphilis can and does influence the thyroid gland in certain isolated cases may well be, but that it is not of great etiological significance in the majority of instances of myxedema and hypothyroidism in children is borne out by the clinical investigations of other observers. Hazen (3) in a complete study of the effect of acquired syphilis on the glands of internal secretion, arrives at the conclusion that there is little in the literature on the part lues can play in the causation of hypothyroidism.

In a recent review of the literature on childhood myxedema in North America, I (6) collected and studied 379 cases of this disease which have been published since the appearance of Jacobi's first case in 1879. A search for syphilis as a causative factor was very discouraging. As the gauge of the incidence of syphilis would depend upon the occurrence of luetic manifestations in either the patient or parents or else in the confession of luetic infection in the parents, especially in the period antedating the Wassermann reaction, and as luetic symptoms are rarely mentioned, it is impossible to state with any accuracy just how much or how far syphilis is responsible. Even in those cases reported since 1906, the date of the introduction of this test, there are but a few instances where either the Wassermann or syphilis are mentioned. Herrman (7), in reporting forty-one cases of sporadic cretinism, does not present any figures, but in referring to the occurrence of syphilis in the family history of his patients, states that it may act as a contributory factor but that in the majority of cases it is absent. Edelman's (8) case gave a negative Wassermann. Bates (5) reported the case of a young man who had a hypothyroidism associated with syphilis. In my first series (9) I found that ten per cent. of twenty cases of hypothyroidism and myxedema were of syphilitic origin, as tested by both the Wassermann and luetin reactions. A search of the literature in America therefore is not conclusive as to the part syphilis plays in the causation of these conditions. In the few instances mentioned, its etiological significance was not great.

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This series is based upon a study of the Wassermann and luetin reactions in forty-two children suffering from some form of diminished thyroid secretion in an attempt to valuate the importance of syphilis as an etiological factor in the production of these diseases. While it is appreciated that syphilis cannot be ruled out completely until a negative history, clinical examination, and a negative Wassermann reaction have been obtained in both parents in addition to negative serological and clinical findings in the child, still it was felt that the incidence of both the luetin and the Wassermann reactions in the child might throw some light on this condition. It is very difficult in outpatient work to obtain the complete cooperation of the parents, especially when it involves the examination of the blood of both father and mother.

The nomenclature used in this series was as follows: The term childhood myxedema designates all types of myxedema in children and is subdivided into congenital, infantile and juvenile myxedema. Congenital myxedema is a condition in which a child is born without any thyroid, not even the slightest trace of connective tissue or thyroid cell to show that a thyroid had ever existed. Only four examples of this type have ever been reported in this country. No case of this variety was encountered in this series. Infantile myxedema, or the socalled sporadic cretinism, is a condition in which the child is born with a defective thyroid but which does not present any symptoms of a disturbed function until the child is a few months or a few years old.

Juvenile myxedema is described as a condition in which a child is born with a normal thyroid functionating normally but in which changes take place following the occurrence of some acute infectious disease or process. Hypothyroidism in the minor forms is referred to as hypothyroidism. Of the forty-two cases, there were: thirteen cases of infantile myxedema, one of juvenile myxedema, twenty-four of hypothyroidism and four of hypothyroidism associated with hypopituitarism.

The sexes were almost equally represented, there being twenty males and twenty-two females. The ages ranged from eighteen months to ten years. The family history did not show any syphilitic taint in any of the cases except in two. In one, the mother's blood gave a three plus Wassermann reaction while the child's blood and spinal fluid were both negative; the child did not present any clinical syphilitic manifestations. In the other case, the mother gave a history of several miscarriages, her blood Wassermann was two plus and the child's one plus. There was one case each of a history of goitre in the mother, alcoholism, diabetes and tuberculosis.

The luetin test is included in this series because it is felt by some observers that it is of particular value in the diagnosis of congenital syphilis and that "an unmistakably positive reaction may be accepted as evidence of syphilis even though the Wassermann test is negative" (Kolmer) (10). In a previous paper I (11) found that the luetin test was of more value in congenital syphilis than the Wassermann reaction. Therefore those cases in which a positive luetin test was obtained were considered positive cases of syphilis irrespective of the Wassermann findings. Of the forty-two cases, eleven were tested by both tests, twenty-nine by the Wassermann reaction alone and two by the luetin test, with the following results:

1.

Wassermann and luetin tests	11
Negative to both	8
Positive to both	2
Positive to luetin and negative to Wassermann	1
Positive to Wassermann and negative to luetin	0

2.

Luetin alone—	
Positive	1
Negative	1
Wassermann alone—	
Positive 4 plus	0
Positive 1 plus	1
Negative	28

SUMMARY OF TESTS.

Positive—	
Wassermann and luetin	2
Luetin	2
Wassermann	1
	5
Negative	37
Total number of cases	42
Incidence of positive tests	12 per cent.

The blood for the Wassermann reaction was examined by the Walker-Ellis method, most of the cases having a second examination. In two cases, we were able to refer the children to the hospital for a spinal fluid examination. Both gave negative blood and spinal findings. It is regrettable that we were unable to obtain more. We tried to obtain the blood examinations of the mothers, if accompanied by them, but with little success as only six consented. These were all negative with the exception noted above. We considered the case which gave a one plus Wassermann reaction as positive because of the two plus reaction in the mother coupled with her history of miscarriages.

The incidence of syphilis in this series is higher than that placed by Jeans (12) for that found by him in the general infant population. A review of the literature by this writer showed that five to six per cent. of the infant population are infected by syphilis, with a higher incidence for older children. Of the five positive cases, two were in infantile myxedematous idiots, one in a mentally defective girl with manifestations of a hypothyroidism and a hypopituitarism and two in cases of minor hypothyroidism. Three of these five were unquestionably mental defectives.

SUMMARY.

There is little in the literature on the part syphilis can play in the causation of myxedema or hypothyroidism in children. Future studies of these conditions should be directed along lines which include serological and clinical investigations of patient and parents. No endocrine case report should be considered complete unless all modern scientific aids have been utilized in its study. Endocrinology will never be a scientific study until it is attacked by scientific methods. The results obtained in this series indicate that syphilis is not of great etiological importance in the causation of either myxedema or hypothyroidism in children. It is, however, possible for syphilis to attack the thyroid gland with the production of these conditions. The presence of a mental deficiency in three of the five positive cases is significant of the predilection of the spirocheta pallida for the brain and nervous system.

REFERENCES.

1. Pentagna, O.: *Pediatria,* Naples, 1920, 28, 455; abstr. *Endocrinology,* 1921, 5, 112.
2. Albadalijo, L.: *Estudios, Med.* (Murcia), 1920, 3-17; abstr. *Endocrinology,* 1921, 5, 109.
3. Hazen, H. H.: Affections of Endocrine Glands in Acquired Syphilis, *American Journal of Syphilis,* 1919, 3.
4. Harrower, H.: *Internal Secretions, in Practical Medicine,* Chicago Book Company, Chicago, 1917.
5. Bates: *American Medicine,* 1918, 13, 725.
6. Gordon, M. B.: To appear in an early number of *Endocrinology.*
7. Herrman, C.: *New York State Journal of Medicine,* 1914, 14, 394.
8. Edelman, M.: *Archives of Pediatrics,* 1916, 33, 932.
9. Gordon, M. B.: Study of Fifty-five Cases of Hypothyroidism in Children, *Archives of Pediatry,* 1918, 35, 577.
10. Kolmer, J.: *American Journal of Diseases of Children,* 1920, 19, 344.
11. Gordon, M. B.: Value of Luetin Reaction in Congenital Syphilis, *Archives of Pediatrics,* 1916, 33, 186.
12. Jeans, P. C.: *Am. Jour. of Syphilis,* 1919, 3, 114.

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A Case of Hypothyrosis in an Infant*

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The manifestations of diminished thyroid function may be divided into two great classes, those occurring in adult life and those occurring in childhood. The adult type is known as myxedema adultorum or cachexia thyreopriva adultorum. Spontaneous myxedema may occur. This is a rare disease that has been seen in England and in Holland more frequently than on the Continent. The most frequent cause of the adult form of this disorder is too complete surgery of the thyroid gland. Syphilis, actinomycosis and tuberculosis of the gland, enteric fever, and acute articular rheumatism are less frequent etiological factors Myxedema is more common in women than in men. Hypothyrosis in women is prone to become more marked during pregnancy, and myxedema may develop during sexual involution.

The type of the disease occurring in childhood is of the greatest importance. This form of hypothyrosis is usually termed cretinism, and may be subdivided into sporadic cretinism, infantile myxedema and endemic cretinism. These forms do not differ greatly, if at all, in their clinical manifestations, but they do vary etiologically. Sporadic cretinism may be idiopathic, or the result of pathological changes in the thyroid gland resulting from local or constitutional disease. Infantile myxedema usually has a surgical cause. Endemic cretinism is that form of the disease occurring in the offspring of goitrous parents. This latter group is found principally in the sections of Continental Europe where goitre is prevalent, such as Styria, the Tyrol, Savoy, Piedmont, and in Switzerland, where goitre and cretinism are so constantly seen that both may be considered endemic. For the most part the cretinism met with in the United States is of the sporadic type, inasmuch as it is not seen endemically even in those sections where goitre occurs so frequently as to be considered endemic. The reason of this has not been explained. That cretinism may be found in the offspring of goitrous parents in this country cannot be denied. The clinical history of such a case is presented.

Case I.—J. B., aged six months; female; white; the third child of young Italian parents, who came from Sicily. Chief complaint was constipation and failure to develop. The mother had an enlarged thyroid gland which appeared during her first pregnancy, but which enlarged for the most part during the last pregnancy. There was no evidence either of increased or diminished function and the gland was apparently cystic. The other two children were, respectively five years and nineteen months of age, and were perfectly healthy. This child was born at full term in normal, noninstrumental labor. She was breast fed for five months and then placed on a cows' milk formula. She failed to thrive on this mixture any better than on breast milk. She took any sort of feeding poorly. Because of this and the constant constipation she was brought to the clinic.

Examination showed an infant measuring twenty-two inches in length and weighing ten pounds and nine ounces. The face was thick and dull or stupid. The eyelids were puffy and closed, and on raising them a well marked internal strabismus was seen. The nose was thick, flat and occluded. The mouth was broad and opened, with thickened lips, and the tongue protruded, was broad and thickened, and filled up the oral cavity. The neck was short, and fatty deposits were noted in this area. The thyroid gland could not be palpated. The trunk was long compared with the extremities, which seemed shorter and thicker than normal. The heart and lungs showed no abnormalities. There was a large protuberant umbilical hernia and the abdomen was protuberant. The extremities were markedly short in relation to the length of the trunk. The hands and feet were broad and the digits were short and stubby. The legs were bowed. The hair was coarse and very sparse, but fairly long. There was a seborrhea of the scalp. The skin over the entire body was greatly thickened, and was extremely dry, and in places there was marked desquamation. The temperature of the skin was low, especially of the extremities, and the skin presented a mottled appearance. The baby was impassive to examination and took no interest in its surroundings. The Wassermann test was negative. X rays showed nothing except the shortness of the long bones.

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Thyroid extract was ordered, a grain and a half a day in three doses. There was an immediate and marked improvement. The child began to take an interest in its surrounding, and to react to its environment. The tongue lost its thickened appearance, the eyes opened and the baby seemed to notice objects. The head and extremities were moved freely. The appetite improved and the constipation disappeared. The myxedematous appearance was lost, the skin became softer and less thickened, and the desquamation ceased. The mottling, however, remained, although the circulation of the extremities seemed improved and the hands and feet were less cold. There was an initial loss of weight coincident with the disappearance of the myxedematous swelling, but as the appetite improved and the formula was more readily taken, this weight was regained. Under the continuation of this treatment, with some reduction from the initial dose, the improvement has been progressive.

The clinical picture of hypothyrosis is typically outlined in the case described above. The syndrome is so complete that there is no basis for questioning the diagnosis. Obviously, many cases arise in varying degrees of severity, so that at times the manifestations are slight, and the resemblance to some other disease may call for a differential diagnosis. Such conditions are simple retarded development, idiocy from organic brain disease, chondrodystrophy, rickets and Mongolian idiocy. In retarded development there are no abnormalities of the bones, skin and mucous membranes, and the limbs are of normal length in relation to the length of the body. Congenital idiocy has only one feature in common with cretinism, and that is impaired mentality. Chondrodystrophy is principally a disease of the bones, and gives no abnormality of mental development or of the skin and mucous membranes. Any doubt may be cleared up by the use of the x rays. Rickets should not cause any confusion, as all of the cretinoid characteristics are lacking, and the presence of manifestations of rickets should make the diagnosis evident.

Mongolian idiocy is the most frequent source of confusion. In this disease are found the oriental slant of the eyes, the broad flat bridge of the nose, and the overdevelopment of the epicanthic fold of the eyes. The most important evidence is gained from the measurement of the proportion of the length of the extremities to that of the entire body, which is always lessened in cretinism, and is unaltered in mongolian idiocy. The myxedematous changes in the skin and mucous membranes are not seen in the mongolian idiot, who also reacts vigorously to his environment, and is less dull and less placid than the cretin. The final and conclusive point in differential diagnosis is the therapeutic test. While there may be some slight improvement under thyroid medication, in none of the other conditions will the response be as rapid or as marked under the administration of thyroid gland as is seen in hypothyrosis.

The occurrence of hypothyrosis in the offspring of a goitrous parent, especially of a goitrous mother, is of great interest. It would seem that this child had been suffering from the lack of thyroid secretion probably since birth, or this may have been a case of congenital athyrosis. The administration of thyroid gland in the presence of a normal thyroid gland is prone to stimulate hypersecretion and hypertrophy of the gland. It is also probably true that the absence, or a diminished amount, of thyroid material in the system may be the cause of an atrophic or poorly developed thyroid, for the reason that the thyroid glandular elements are not stimulated to action. In this mother thyroid secretion was greatly diminished by the cystic degeneration of the gland, so that at best secretion was adequate only for her protection. During the gestation no more thyroid secretion was available, and perhaps the thyroid secretion was lessened by pregnancy. As a result there was little or no stimulation or development of the gland in the child, and this disease of the child may have resulted in this manner. Had a wet nurse suffering from hyperthyrosis been available, the result of this baby suckling from such a source may have been extremely interesting.

The prognosis of hypothyrosis is good except for the danger of intercurrent infectious disease, especially pneumonia. The response to the administration of thyroid gland is prompt and quite marked. In the more severe grades necessity demands that the administration of thyroid gland be continued over an indefinite period, probably intermittently until adult life had been reached. In these cases, while it is hoped that sufficient secretory activity of the gland will develop to supply the demands of the body during the period of growth and development, it is highly probable that the supply of thyroid secretion may fall below the demands. It therefore becomes a part of the proper management of these cases to be on the alert for evidence of thyroid insufficiency, and it is a better practice to administer this material where it may not be needed rather than to allow a condition of deficiency to arise. The development of mental and osseous changes are to be prevented if at all possible. For the same reason it is better to follow this therapeutic régime in doubtful cases, rather than to allow a case of hypothyrosis to go untreated and unrecognized.

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Editorial Articles

DIET AND THE ENDOCRINE GLANDS.

The influence of diet upon health is now almost an article of faith with a large proportion of the medical profession. In preventive medicine diet plays a part as important, perhaps, as environment, and by paying proper attention to the food one eats a large number of diseases and conditions of ill health may be avoided or warded off. It is a truism that if the body is adequately nourished it will resist many of the most dangerous diseases and especially, of course, those of an infectious nature. It is beginning slowly but surely to seep through the minds of medical men generally, that the endocrine glands are organs of great importance. If these organs work smoothly and harmoniously good health is the result, and when they do not so function the reverse happens. Therefore, if this proposition is accepted, the obvious conclusion is that every effort should be directed to maintaining the endocrine glands at a high standard of efficiency.

In this issue we present a paper by one of the greatest living authorities on the subject of food in its relation to the internal secretions, Colonel McCarrison, who discusses some of the effects of faulty food on the endocrine glands. He deals somewhat briefly with the effects on the endocrine organs of inanition from vitamine deficiency in association with faulty balance of food, devoting most of his attention to the effects on these organs of fat excesses in relation to the thyroid gland.

In his experiment for the purpose of contrasting the action on the thyroid gland of pure oleic acid with that of butter and codliver oil, he demonstrated that oleic acid was peculiarly potent in producing goitre and that codliver oil containing 0.002 per cent. of iodine was peculiarly beneficial in preventing goitre. As McCarrison says, these facts point to iodine as a common factor in these results. The results of this series of experiments indicate that there is such a thing as a fat thyroid iodine balance, and that this balance may be disturbed either by an intake of iodine insufficient for the needs of the body in the particular circumstances in which it finds itself, or by the presence in the digestive tract of an excess of free unsaturated oleic acid. Goitre may arise, therefore, either from actual or from relative deficiency of iodine. In short, an excess of edible fat or of free oleic acid in the digestive tract may bring about a relative deficiency of iodine in the food and tend to produce goitre. McCarrison has shown clearly, indeed he has proved by careful experiments, that profound disturbances of endocrine function may be brought about by faulty food.

We are gradually learning certain definite facts with regard to the endocrine glands and their close relationship with diet. It is known that the vitamine and protein contents of food ingested must be adequate and suitable to individual requirements, but there is much yet to be learned in this connection. It is also known that the metabolic balance of a diet must be more or less accurate, and that this balance depends largely on whether such a diet is suitable to the endocrine organs concerned. Lastly, food of such a nature must be eaten as to maintain and sustain the balance of power between the thyroid gland and the adrenal bodies. As previously stated, McCarrison has demonstrated that an excess of edible fats in the food may, in certain circumstances, involve a relative deficiency of iodine and so stimulate the thyroid gland that goitre supervenes and, moreover, that the unsaturated fatty acid, oleic acid, is peculiarly harmful in this direction.

This point, however, should be emphasized that progress is being made, if not rapidly, at any rate surely, in our knowledge of the function of the endocrine glands. Diet exerts a profound influence on these organs, and consequently their close study is an essential part of preventive medicine. Colonel McCarrison's paper is illuminating in this regard.

THE ETIOLOGY AND PATHOGENESIS OF CLEFT TONGUE.

It is hardly necessary to say that for a clear understanding of the etiology and pathogenesis of lingual clefts and fissures a thorough knowledge of modern embryology is essential. The tongue in the embryo develops by two buds, anterior and posterior. The former appears early as median tubercle on the buccal floor in the triangular space limited by the lower maxillary folds, in other words, the mesobranchial space. It gives rise to the base and tip of the tongue. The pharyngeal portion of the tongue is formed by the persistence of two slight furrows, corresponding to the second pair of branchial clefts, and by their upward development furnish two buds, one on the left and the other on the right, representing a double starting point from the base of the tongue. The anterior tubercle develops backward above the two posterior buds which it finally partially covers and remains separated from them by a V shaped sulcus, the apex of the V marked by the foramen cæcum. Later, the sulcus and foramen are effaced. The anterior tubercle rises forward above the lower maxillary, from which it is separated by a curvilinear sulcus, so that the pointed body of the tongue becomes free in the buccal cavity.

In the case of a trifid tongue there is probably an exaggerated development with absence of joining of the three primary buds, but this does not explain a bifid tongue, and here the teachings of Lannelongue, of Bordeaux, seem to be most applicable. He points out that in the majority of congenital defects the beginning is to be found in amniotic adhesions and tumors. Those occurring in the cervical and facial regions are at times due to certain pathological disturbances inherent in the embryo, and in other cases to organic changes in the placenta which by a purely mechanical procedure prevent union or provoke disunion of the soft parts.

Although the part played by tumors in the genesis of certain facial congenital defects is unquestionable, that of amniotic adhesions is not less evident, especially when this membrane does not follow its regular development. The abnormal folds that it may present, especially the adhesions to the surface of the embryo, appear to be among the most important causes of several groups of congenital defects. The cephalic extremity surrounded by its amniotic hood offers in its development a series of peculiarities which singularly favor the disposition to adhesion, the adhesions in turn being an obstacle to the union of various parts of the embryo. Now, in congenital clefts of the tongue is the defect due to an embryonal tumor or to an amniotic adhesion?

In the cases reported by Crauste, Barling, and Guyot, the clefts were complicated with tumors. In Crauste's first case a fibromyoma the size of a thumb was implanted at the apex of the cleft on the buccal floor and lower maxillary, and in the second case a cyst of smaller size was found on the frenum at the apex of the fissure. This special site for the tumors in certain cases of fissure would seem to have an important bearing on the genesis of the lingual defect. It would seem that the anterior tubercle in its expansive movement toward the buccal orifice had collided with the tumor and at this point had divided into two secondary buds by a purely mechanical process.

In Parise's case there was a cicatricial band which must have been an amniotic adhesion. As His has shown, the entire cervical region is occupied by the mesobranchial area, a median single organ. At this level no line of coalescence exists and consequently the existence of this band cannot be regarded as the intrauterine cicatrization of a normal fissure at this point. In the particular case reported it would seem logical to admit, in spite of the absence of any vestige, that the amniotic band involving the median line of the cervical region was at the same time implanted on the lower maxillary—hence division; and on the anterior tubercle—hence a bifid tongue.

Congenital tumors and adhesions seem to be the most frequent factors of cleft tongue. The causes of the tumors and adhesions may be syphilis, alcoholism in the parents, heredity, and various infections and toxic processes. All these, however, are largely hypothetical and syphilis alone would seem to be the most probable in the long list of possibilities.

ASCENT OR DESCENT.

The present ostrich fashion, dicrotic wave agitation against the doctrine of evolution or the teachings of Darwin has occurred at a most unexpected hour. Unexpected, because the leaders in religion, save in a few unprogressive sects, long ago recognized that those supposedly nefarious ideas were neither likely to put them out of a job nor to undermine the foundations of faith. But more unexpected at the close of a manifestation of human nature so hideous that it makes any thinking man wonder if we are not descended from the devil and to question the value of the prevailing faiths so far as their influence in conduct is concerned. For the gods of sects were lined up and prayed to by all hands in the conflict. The only saving hope to be had at the moment is the belief that we may still be evolving though in a very roundabout way, and, as St. Gaudens remarked, "damned slowly," toward a time when larger notions of religion will prevail and man will have become less barbarous.

As for our relationship to apes and to other so-called lower animals. None of these ever behaved so outrageously as have the humans, and if we are not descended from monkeys, there is little present evidence, save in the outer veneer of civilization, that we could have ascended from them to any notable extent. A chimpanzee is much more to our liking than a biped that goes about squirting poison gas and throwing bombs, and he is vastly more a companion of the mind than a man who talks volubly about things of which he has made no study and whose faith is so weak that he fears it will be undermined by the spread of classified knowledge.

We venture to say that no man who has really studied carefully the evidence for the theory of evolution has ever for a moment doubted that the God back of such a mode of procedure was bigger than that behind any other ever put forward to explain the origin of present day goings on in Nature.

Even with the inestimable help which the theory of evolution has given to science in all its branches, the mystery of life—its whence and whither—looms as large as ever, and there is more need for a religion that goes beyond the unevolving and, hence, dying sect which uses the yard stick of tradition to measure the Infinite.

PADUA UNIVERSITY ANNIVERSARY.

An event of more than passing interest to the medical profession is the seven hundredth anniversary, to be celebrated this spring, of the founding of the University of Padua, Italy, for Padua has played a very important part in the history and development of the science of medicine. For more than a century Padua was preeminently the world's greatest centre of medical knowledge and discovery. Students flocked to it from all parts of Europe and received surgical and other instruction such as could nowhere else be supplied. England, Scotland, France, Poland, Spain, Scandinavia and Germany each sent many thousands of medical students to the school and these, going back to their native countries with their degrees, spread the influence and the teachings of their alma mater far and wide. In this way Padua was a factor in the advancement of medical science to a degree that was great and farreaching beyond measure. Padua in its heyday was particularly noted for its surgery and anatomy, though medicine and botany were not neglected. A great garden of herbs, oval in shape, was a feature of the university of which Paduans were very proud.

Padua was the pioneer of clinical instruction in hospitals, by means of which the foundations of modern medicine were laid. Nowhere in Europe could the progress of disease be studied to such advantage; the students visited the hospitals and had the symptoms detailed before their eyes. Giovanni De Monte (Montanus), humanist of note and often called the father of the clinic, was the first to give lectures in the hospital of St. Francis with the patients of that institution as his subject. Padua blazed the trail in this respect, but left it to Leiden University to develop the idea along greater lines. At Padua, also, was inaugurated the practice of dissecting the dead to ascertain the nature of diseases, an innovation which ushered in the modern period of the science of pathological anatomy. There, too, the earliest experiments in vivisection for the purpose of investigating human maladies were made by Realdo Colombo, who contended there was more to be learned from one vivisection than from all the writings of Galen, an intrepid assertion for that day. Colombo was but one of the glories of Padua's faculty. Among the others who helped to uphold the unrivalled prestige of the university were Eustachio, whose name is perpetuated by the Eustachian tube to the middle ear and the Eustachian valve of the fetal heart; Andreas Vesale (Cesalius), founder of the modern system of anatomy; Gabriele Falloppio, whose name is perpetuated by the Fallopian tubes; Sanctoro Sanctorio, Pietro Marchetti, Girolamo Fabrizio and several others. It was to men of this calibre that Padua and Italy owed their preeminence in all branches of surgery and anatomical science during the greater part of the sixteenth and seventeenth centuries. Three generations of professors of this progressive intrepidity, not only in medicine but also in other sciences, gave Padua an easy lead among European educational institutions, but despite the fact that Galileo and other lesser lights in other lines were of the Padua faculty, it is to medicine that Padua owes its greatest fame.

Padua's faculty is rivalled in medical history by its host of students who became distinguished in after life. In the medical profession alone a hundred names could be mentioned. Among British students who obtained their medical degrees there perhaps the most distinguished was William Harvey, discoverer of the circulation of the blood, who studied anatomy under Girolamo Fabrizio and obtained his degree in 1602. Sir Thomas Browne, author of *Religio Medici,* also studied at Padua, and Dr. Arthur Johnson, the earliest physician-poet, was a Padua product. Another distinguished product of Padua's medical school was Dr. John Kaye, or Key, who latinized his name to Caius. He founded Caius College, Cambridge University, was a zealous disciple of De Monte, and carried his clinical ideas to England.

Like many another institution of learning, the University of Padua has had its ups and downs. Founded in the year 1222 in the picturesque little Italian city which is the scene of Shakespeare's *Taming of the Shrew,* it began its career merely as a school of civil and canon law, and had a hard struggle for existence. Its very founding was of a romantic turn, the result of the migration of a large group of rebellious students from the then youthful University of Bologna. During the latter part of the thirteenth century it incorporated the faculties of grammar, rhetoric and medicine, and soon became one of the most flourishing schools in Italy. From that time on, until the beginning of the eighteenth century, Padua was the university in Italy to which students from northern Europe were most indebted. Its period of greatest glory was the seventeenth century, the medical period. In the course of time Leyden and other universities of the Low Countries supplanted it in popularity among students of northern Europe, and soon after the beginning of the eighteenth century Padua's lamp of learning ceased to burn so far as the north was concerned. It became dimmed, too, in other respects, a number of reasons, political, geographical, religious, contributing to its decline. But despite its age and vicissitudes, Padua still is a flourishing seat of science, no longer a world centre, to be sure, but rejuvenated sufficiently along modern lines, with new courses undreamed of when the first students came to it in 1222, to keep it well in the running. Even its buildings have been modernized, beautified and enlarged, and Padua looks forward to another seven hundred years of usefulness. The birthday celebration is to be held some time in the spring, and the authorities are preparing a wonderful program, to which representatives of colleges in all parts of the world have been invited.

THE MURDER OF THE INNOCENTS.

It is easy to forget the things we do not see, yet as long as they exist as a great corroding mark across the face of the future they must be remembered. An observer (Armin T. Wegner: Der europäische Kindermord, *die neue Generation*, XVII, No. 10, October, 1921, of the condition of the children in Europe recalls to our minds some of the ugly facts. He makes no conventional plea for aid such as those which have been repeated so often that our ears have been dulled. His appeal is as if from the mouths of the children themselves, asking why they should be born into a world that has destroyed the things that would have warmed, clothed, and fed them. His article is not so much a plea as an impassioned reminder of the crime of the war, a reminder that carries its demand in its own story.

The writer pictures in detail, with statistical support, the condition of multitudes of children in the larger cities of Germany. The same facts, as he points out, are true also of the children in any portion of Europe from East to West, in the lands devastated and disorganized by the events of recent years. He pictures the seven stages through which these children pass in this adverse world to which they involuntarily come. They are born from anemic bodies into the cold air of cheerless rooms. Newspaper serves for their wrappings. Though the relative death rate among the newborn appears to be less than in former years, he asks us to remember how much less the number of births has become before congratulating ourselves that such conditions do not make for mortality.

The succeeding stages of distress, moreover, make of the successful birth something other than a joy and gladness. Not milk from the mother's breast but meal stirred in water, coffee, coarse grits furnish the nourishment offered. The mother sells the certificate which would entitle her to some milk from the State because of more pressing needs. Dry bread spread with cold potato furnishes the diet later when the child is old enough to stand with the mother and beg. Stunted in their growth, a generation of dwarfs seems to be taking possession of the streets.

The cold of the greater part of the year provides its full measure of suffering. Among thousands of school children one piece of underwear must do for several or there is no such garment at all even to be shared with another. Many others are driven to seek some relief in cold beds or they must sleep huddled with adults, perhaps without beds, the prey of uncleanliness, infection and vermin.

The actual inroads of scrofula upon the children mark them still more evidently as victims of the evils of the time. Swollen glands, inflamed joints, blisters on the nose, lips and head are some of the signs which go to make up their picture of misery, and for the observer the lesson of world wide reproach. More alarming still for the future is the prevalence of tuberculosis, the fifth stage of wretchedness which the writer describes. Every fourth German, he tells us on the authority of the welfare commission, is stricken with tuberculosis, most of them from infection during childhood. Among the young in Prussia the number of such victims has been nearly trebled since 1915. The disease is of the form that spreads gradually through the organism for decades, until at last the body, fairly honeycombed by the diseased tissue, which has reached even to the point of great cavities with tumors, collapses in a rapid end.

Meanwhile, rachitis also takes its toll. Here the inroads made upon infants are beyond reckoning. The cartilaginous discs deprived of their proper nourishment are insufficient to support the weight put upon them so that they cannot prevent the malformation of the spine while the collapsed form of the breast, the swollen cartilages wreathed about the body, the deformed limbs characterize the distressing condition of these children. Other diseases are multiplied to fill up this picture of hunger, cold and the sufferings that follow in their train. "Thus do the cripples of hunger take their place with the cripples of the war. Indeed no one who feels dares think where it must lead if these dwarfs and enfeebled ones impelled by the same hunger for pleasure, reproduce themselves to fill the stage of future generations with the evidences of our crime." "Who is there among us upon the earth, who himself at some point in his life does not bear the guilt, who has not lifted his hand to this murder through hate, thoughtlessness, cowardice, weakness? Believe not that you can redeem yourself through sacrifices of money if you do not build up the world in a new spirit. These sacrifices you have always thought of as repayment or justice. Is not this latter also out of revenge?"

POOR JOHN!

The *Pharmacopœia* is being translated into Chinese and we are told that the translators are having no easy work of it. Certainly no one envies them their task, nor can anyone envy the Chinese that this truly monumental work is to be introduced to them in a shape in which they can easily make its acquaintance.

We have seen it stated that this volume is to be foisted upon the Oriental mind as representative of western standards of medical learning. Shades of Oliver Wendell Holmes! Have we made so little progress that this treasury of past learning—of "it has been used in so and so but is now found to have no effect in this disease"—must be taken as representative of our learning? If it is to stand as a ponderous and imposing monument of medical ignorance pointing to our past futile experiences in the prescribing of innumerable pellets, powders and potions, well and good, but, otherwise, we cannot recognize it as illustrating the greatness of western science.

Modern medicine begins where the *Pharmacopœia* leaves off, and in taking that science and art to the Orient we would do well to leave such voluminous drug books at home. We have the opportunity of founding in the East a school of medicine comparatively free from attempts at doing the impossible—free to develop along lines of prophylaxis and of treatment founded on rational principles. Moreover, there is the opportunity, going abegging in the West, of a full development of the prevention and treatment of diseases by physical means of which the *Pharmacopœia,* of course, says never a word. It is earnestly to be hoped that John Chinaman, M. D., is not to be a doctor who will merely sit at his desk and write prescriptions in the old fashioned way.

If all reports from China are true, that country is receiving an excellent popular education in public and private health matters, and the response to such efforts would seem to be most encouraging. Doubtless the schools of medicine will present the subjects of public health in a manner worthy of the name of western science.

CORRECTION.

In Sir Sydney Russell-Wells's article on The Facies in Mitral Stenosis and Aortic Regurgitation, published in our issue for February 15th, an error occurred, the word auricle being used where ventricle was meant. The sentence containing this error is on page 199, second paragraph, and should read: "Further, rigid vessels, as can be demonstrated on a schema, cause an early fall in pressure while the blood is still flowing out of the ventricle."

News Items.

New Building of Harlem Eye and Ear Hospital Opened.—The new building of the Harlem Eye and Ear Hospital, Lexington Avenue and 127th Street, New York, was formally opened on Tuesday evening, March 14th.

Harvey Society Lectures.—Dr. W. J. V. Osterhout, professor of botany, Harvard University, will deliver the eighth Harvey Society Lecture at the New York Academy of Medicine, Saturday evening, March 25, 1922. His subject will be The Mechanism of Injury, Recovery, and Death.

Board of Health to Regulate X Ray Laboratories.—At a meeting of the Board of Health held on January 26, 1922, resolutions were adopted providing for the amendment of certain sections of the sanitary code governing the conduct and maintenance of x ray laboratories in New York.

Gift to Johns Hopkins School of Hygiene and Public Health.—The Rockefeller Foundation has given to Johns Hopkins University $6,000,000 to be used as an endowment and building fund for the School of Hygiene and Public Health. Of this amount $1,000,000 is to be spent on buildings, the remainder constituting an endowment fund.

Fatal Accidents on Streets During February.—According to the report of the National Highway's Protective Society, eighty persons were killed on the highways of New York State and city in February. In New York city forty-one persons were killed by passenger automobiles and fourteen by trucks. Trolleys killed four and wagons two.

Leprosy in New York.—On January 1, 1922, there were thirty-five reported cases of leprosy in the Greater City of New York, an increase of seven during 1921. Of these cases twelve only were in municipal hospitals, the other patients being at home pursuing their regular vocations. All are periodically examined by a Department of Health inspector.

Swedish Physicians Not Compelled to Testify.—A decision recently rendered by the Lower Court of Appeals at Stockholm, Sweden, rules that in Sweden, as in America, physicians cannot be compelled hereafter to give evidence in court against their will in medical cases with which they have been professionally connected. The decision reverses the lower court.

Physicians' Contributions to Jewish War Relief Fund.—Responding to an appeal, Jewish physicians of Manhattan and Bronx have contributed over $40,000 to the New York Campaign for Jewish War Sufferers. The original quota assigned to the medical profession was $25,000, but it is expected that more than double this amount will have been raised before the campaign is closed.

Scientific Study of Juvenile Delinquents.—Dr. William Healy, director of the Judge Baker Foundation in Boston, has issued a report, through the Children's Bureau of the United States Department of Labor, on the Practical Value of Scientific Study of Juvenile Delinquents. This report declares that all delinquent children need scientific treatment and that mental tests alone do not suffice to give a true picture of the child's personality.

Bill to Prevent Fee Splitting.—A bill to prevent fee splitting among members of the medical profession has been introduced into the State legislature. The proposed measure will make the splitting of fees a punishable offense.

Eugenics Research Association.—At the annual meeting of this association, which will be held in Cold Spring Harbor, N. Y., on June 10th, Dr. Lewellys F. Barker, of Baltimore, will deliver an address on Heredity and the Endocrine Glands.

Dr. Work Sworn in as Postmaster General.—Dr. Hubert Work, of Colorado Springs, Colo., took the oath of office on March 4th as Postmaster General of the United States. Dr. Work was first assistant postmaster general under Mr. Hays.

Gift to Establish Cancer Field Service.—At the annual meeting of the American Society for the Control of Cancer, held in New York on February 24th, announcement was made of a grant of $26,750 by the Commonwealth Fund of New York City to establish a field service in this country and Canada, to spread information regarding cancer.

Another Gift for Johns Hopkins University.—In addition to the $6,000,000 recently given to it by the Rockefeller Foundation, the Johns Hopkins University has received an offer of a gift of $3,000,000 from an unnamed donor, conditional on the university raising an additional $1,000,000. Plans are being made for the expenditure of the new funds and for the raising of the required million.

London Hospital Not to Take Women Students.—It is reported that the London Hospital has refused to accept any more women students. The board of governors in announcing the new policy said there was no objection to the medical education of women and difficulty had been experienced in teaching a mixed class. This hospital first admitted women during the war as an experiment, and the authorities announce that the experiment has been a failure.

Appointments to the Medical Faculty of Columbia University.—Dr. Horatio B. Williams has been appointed Dalton professor of physiology in the School of Medicine, Columbia University. Dr. Williams has been chairman of the National Research Council Committee on Research Methods and Technic in Physics since 1920. Dr. Walter W. Palmer, Bard professor of the practice of medicine, has been made a member of the Administrative Board of the Institute of Cancer Research, to serve until June 30, 1924.

Quackery in Germany.—According to the Berlin correspondent of the New York *Herald*, quack physicians are overrunning Germany and qualified doctors are demanding that the activities of these quacks be stopped by legislation. It is pointed out that during the period in which Germany's population increased by six per cent. the quacks increased six hundred per cent. The correspondent says statistics just published show that there are more than 36,000 physicians in unoccupied Germany, against something more than 34,000 in all Germany in 1913, at which time there were about five physicians to every 10,000 inhabitants; now there are six. The number of women physicians, he says, has doubled in eight years.

Personal.—Dr. Benjamin Schwartz, of 11 East Sixty-eighth Street, New York, has been appointed visiting physician to Gouverneur Hospital.

Colonel E. C. Gibbs, an authority on contagious and infectious diseases, has gone to Europe to make observations of health conditions in Poland, southern Russia and the Levant, particularly relative to typhus and cholera, and will report his findings to the United States Public Health Service, together with suggestions on how to prevent these diseases from creeping into the United States by means of immigrants.

Calcutta School of Tropical Medicine.—The foundation stone of the new School of Tropical Medicine at Calcutta was laid on February 24th by the Governor of Bengal. The Indian Government provided $195,000 for the site and the laboratory and is to contribute toward the upkeep of the institution. The special work of the laboratory will be to investigate the causes of tropical diseases, with a view to finding more accurate methods of diagnosis and improved methods of treatment. This is a matter of great importance in view of the wide prevalence of tropical diseases not only in Calcutta but in India as a whole.

Deaths from Encephalitis Lethargica. — In 1920 in the death registration area of the United States lethargic encephalitis was given as a cause of death on 1,505 death certificates, compared with 589 in 1919, giving mortality rates, respectively, of 1.7 and 0.7 in 100,000 of population. Deaths from this cause were reported for every state in the registration area except Delaware; the largest number in any one state was 364 reported for New York State and giving a rate of 3.5 in 100,000 of population. Cities are credited with 1,129 of the 1,505 deaths and rural sections with 376, with rates, respectively, of 2.6 and 0.8 in 100,000. The white population with 1,453 deaths from lethargic encephalitis has a rate of 1.8 in 100,000 population, while the colored population with only fifty-two deaths has a rate of 0.7. Males and females contribute about equally to the total deaths from this cause, with 781 males and 724 females. More of these deaths appear for persons aged twenty to twenty-nine than for any other age group, though nearly as many are found for the age groups thirty to thirty-nine and forty to forty-nine, and no age group escapes entirely.

Died.

BABCOCK.—In Columbia, S. C., on Friday, March 3rd, Dr. James W. Babcock, aged sixty-five years.

FRICKSTEIN.—In Brooklyn, N. Y., on Wednesday, February 22nd, Dr. Theodore Frickenstein, aged eighty-seven years.

GRAHAM.—In Beirut, Syria, on Sunday, March 5th, Dr. Harris Graham, of the University of Beirut.

STIMSON.—In New York, on Tuesday, February 21st, Dr. Daniel MacMartin Stimson, aged seventy-eight years.

WALL.—In St. Louis, Mo., on Monday, February 13th, Dr. Otto Augustus Wall, aged seventy-five years.

TRUESDALE.—In Fremont, Ohio, on Tuesday, February 7th, Dr. Clayton R. Truesdale, aged fifty-five years.

VOOR.—In Warsaw, Poland, on Tuesday, February 14th, Dr. John B. Voor, of Louisville, Ky., aged thirty years.

WAKEFIELD.—In West Salem, Wis., on Saturday, February 4th, Dr. Solon R. Wakefield, aged seventy-two years.

WALLACE.—In Philadelphia, Pa., on Wednesday, February 15th, Dr. Charles H. Wallace, aged sixty-one years.

Book Reviews

ELECTROCARDIOGRAPHY.

Clinical Electrocardiography. By FREDERICK A. WILLIUS, B. S., M. D., M. S., Section in Clinical Electrocardiography, of the Mayo Clinic, Rochester, Minn., and The Mayo Foundation, University of Minnesota. With One Hundred and Eighty-five Illustrations. Philadelphia and London: W. B. Saunders Company, 1922. Pp. 188.

A book of fine appearance, well edited and with many illustrations. In reading this monograph it is difficult to decide for what part of the medical profession it has been written. For the special worker who wishes a record of the most recent advances in the knowledge of electrocardiography, this book will not fulfil expectations, nor will the clinician, who wishes to learn the place that this method has won in the diagnosis of cardiac disease, find a complete account. The technical explanations are so brief and sketchy that they can scarcely be understood by a man without previous knowledge of the subject, and they lack in detail too much to satisfy one who has.

The fundamental trouble seems to be that the author is unable to express himself in clearly understandable language. Often the reader will find passages where without some knowledge of the subject he will be unable to understand what is meant, but with previous knowledge he will be able to read between the lines what was the author's meaning. Such a statement is: "The contracting heart is an area of electropotential and the derivations may be considered planes transecting this electric field. Electrocardiography is a study of the direction, amplitude and time of the cardiac action currents expressed graphically."

In other places one is surprised that the author is apparently not conversant with some of the more recent experimental work, as when he quotes from Hering (1909) that "the papillary muscles are the first ventricular structures to enter into contraction" and from Kahn (1909) that "the first heart sound falls in the pause between the R and T wave" which "reveals the fact that the R wave is completed before the ventricular contraction begins." All three of these statements have been shown incorrect by the more recent work of Lewis, Fahr and Kahn.

There are many inexact statements in that part of the book devoted to the exposition of the electrical and physiological facts upon which electrocardiography is based, and some of the figures of the clinical part of the book do not illustrate what they are intended to show. For example, Fig. 57 illustrates *incomplete* not *complete* heart block, while Fig. 68 illustrates *auricular fibrillation* with *bundle branch block,* instead of *ventricular tachycardia* as is stated.

The sections dealing with the clinical aspects are largely composed of statistical studies of the etiology and mortality associated with the electrocardiographic abnormalities. These studies are interesting and seem to point to definite conclusions. It is difficult, though, to understand how it could happen that White could obtain an equal mortality after three years in a series of one hundred patients with auricular fibrillation and one hundred cardiac patients without this arrhythmia, while Willius obtained a mortality after four years about equal to White's in a series of five hundred patients with auricular fibrillation, but in his control series a mortality of only a third of this figure. It makes one lose faith in the statistical method of dealing with this problem, an idea which is later made more compelling by the observation that the mortality of patients with notching of QRS in only one lead or slurring of QRS in only one lead is twice that of a controlled series. Notching or slurring of QRS is such a frequent finding in the records of normal young men and women who are under no suspicion of cardiac abnormality, that it is difficult to feel that it is an occurrence of serious import.

The book is profusely illustrated with electrocardiogram in explanation of the text, and for this reason should serve as a useful manual to one who wishes to become accustomed to the appearance of the characteristics of normal and abnormal records. It seems unfortunate that such an unsatisfactory book should be put out on a comparatively new subject. Many who purchase it in hopes of learning something of the value of this new method in cardiac diagnosis will receive a needlessly confusing impression of its fundamentals and its clinical applications.

MEDICAL CONDITIONS IN SOUTH AMERICA.

South America from a Surgeon's Point of View. By FRANKLIN H. MARTIN, C. M. G., M. D., F. A. C. S., Director General, American College of Surgeons; Managing Editor, *Surgery, Gynecology, and Obstetrics.* Introduction by WILLIAM J. MAYO, M. D., F. A. C. S. New York and Chicago: Fleming H. Revell Company, 1922. Pp. xix-325.

It is not especially the literary quality of this book which recommends it. It makes no claims in that direction. It has other aims which it well fulfils. The brief form in which its title appears on the cover is ambitious enough for such a modest little volume to quicken curiosity as to its contents. Such curiosity is amply rewarded by a rapid but by no means merely cursory account of a journey over the vast southern continent from north to south along the west coast, then from west to east. The manner the telling of the story is entertaining, inspiriting and eminently instructive. There is also the story of a similar experience in regard to Panama.

The illustrations, first hand photographs of the spots visited, add to the reader's sense of sharing directly in the pleasant experiences of these surgeon travelers. Not the least interesting and stimulating part of the book are the many photographs of the medical and surgical leaders of the South American continent. A study of their faces brings one into a closer acquaintance with the actual work there and its personnel. It confirms also the high opinion of medical work in South America as reported by the commission due to the high intellectual ability and the progressive character of its leaders.

We wish that in writing of conditions and experiences of all sorts the author had not adopted the policy with which he says he supported himself through an address he delivered in Peru, "the most I could do was to congratulate everybody on something." Because he writes in this commendatory style one does not get quite so close to actual everyday conditions of South America or of our national occupation of Panama as one would like. No matter what the mission of an expedition one craves insight into the humanity which is not in the gala dress of reception committees. Dr. Mayo, in the brief descriptions inserted from his pen, comes closer to the soberer facts of the medical conditions.

NEW DICTIONARIES.

The American Illustrated Medical Dictionary. A New and Complete Dictionary of the Terms Used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Nursing, Veterinary Science, Biology, Medical Biography, etc., with the Pronunciation, Derivation, and Definition, Including Much Collateral Information of an Encyclopedic Character. By W. A. Newman Dorland, A. M., M. D., F. A. C. S., Major, Medical Corps, U. S. Army; Member of the Committee on Nomenclature and Classification of Diseases of the American Medical Association. Eleventh Edition, Revised and Enlarged. Philadelphia and London: W. B. Saunders Company, 1922. Pp. 1229.

A Practical Medical Dictionary. By Thomas Lathrop Stedman, A. M., M. D., Editor of the *Twentieth Century Practice of Medicine*, of the *Reference Handbook of the Medical Sciences*, and of the *Medical Record.* Sixth Revised Edition. Illustrated. New York: William Wood & Co., 1920. Pp. viii-1144.

French-English Medical Dictionary. By Alfred Gordon, A. M., M. D. (Paris), Late Associate in Nervous and Mental Diseases, Jefferson Medical College; Late Examiner of the Insane, Philadelphia General Hospital; Corresponding Member of the Société Medico-Psychologique de Paris, France, etc. Philadelphia: P. Blakiston's Son & Co., 1921. Pp. 161.

A French-English Dictionary for Chemists. By Austin M. Patterson, Ph. D., Formerly Editor of *Chemical Abstracts.* New York: John Wiley & Sons, Inc.. London: Chapman & Hall, Ltd., 1921. Pp. xvii-384.

For over a decade Dorland's dictionary has been standard in medical circles. The eleventh revised edition comes after a lapse of two years and contains many additions which have come as a sequel to medical war terms. The bookmaking comes up to its usual high quality.

* * *

Stedman's medical dictionary, in the sixth edition, makes a most complete and dependable book of medical reference. Twenty additional pages which have been added do not make the book too bulky, but the addition of so much material to an already rather complete dictionary shows how necessary the revision was.

* * *

Gordon has rendered a distinct service in bringing out this French-English dictionary of medical terms. It is carefully gotten up and gives lucid and reliable definitions. We might suggest that some future edition be made to include the English-French text as well.

* * *

Chemists will find in *A French-English Dictionary for Chemists* a valuable dictionary and a companion book to the German-English dictionary which Patterson wrote some time ago. The definitions are brief and fully explanatory. It seems that the usefulness of dictionaries of this type could be enhanced, with a little additional labor, by giving the English-French terms.

A PSYCHOPATHOLOGICAL STUDY OF MURDERERS.

The Manner of Man That Kills. Spencer-Czolgosz-Richeson. By L. Vernon Briggs, M. D., Director of the Massachusetts Society for Mental Hygiene; Member of the American Institute of Criminal Law and Criminology, Société Medico-Physiologique of Paris, France; New England Society of Psychiatry; American Medico-Psychological Association. Boston: Richard G. Badger, 1921. Pp. 444.

A painstaking history of Czolgosz, Richeson and Spencer, three outstanding psychopathic murderers, is presented. He pleads that murderers of this type should not be executed but imprisoned for life in order that they may be better studied. He feels that more progress could be made in a prophylactic way by following this plan than by the effort of driving home the feeling of fear to other potential murderers by execution. There is no consensus of opinion on this vital problem, yet it seems reasonable that there is a weakness in the prevention of crime by capital punishment. At any rate Dr. Briggs has rendered a distinct service in the careful study he has made of these three cases.

SELFANALYSIS.

How to Psychoanalyze Yourself. Theory and Practice of Remoulding the Personality by the Analytic Method. By Joseph Ralph. Long Beach, Cal.: Joseph Ralph, 1921. Pp. 313.

Superficial, distorted, inaccurate and misleading are the milder terms one would apply to this book. It is pathetic to see psychoanalysis dragged through the many mudholes of present day socalled literature. This book serves as an example.

AMERICAN AUTHORS.

Letters on Contemporary American Authors. By Martin MacCollough. Boston: The Four Seas Company, 1921. Pp. 99.

A series of letters on contemporary American authors which treat of some of the salient yet frequently overlooked characteristics of some of the better known American writers. The entire field is not covered, however. Some of the greatest creative artists, like Edith Wharton, are not included. It is not a complete anthology, yet it gives us glimpses of certain personal traits which are stimulating and of interest to readers of the better literature.

THE CHARMED CIRCLE.

The Charmed Circle. A Comedy. By Edward Alden Jewell. New York: Alfred A. Knopf, 1921. Pp. 291.

A chain of incredible circumstances surrounds an American boy in a Paris pension. He is alone in the world, with an owllike guardian. This fact probably accounts for his preternatural wisdom, tact, guile and somewhat oldish mischief making. It is a very light, very impossible, humorous tale, with which a few dull hours may be pleasantly idled away.

Practical Therapeutics

THE PITUITARY HEADACHE IN RHINOLOGICAL PRACTICE.

By John A. Glassburg, M. D.,

New York.

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It is a well known fact that many patients who undergo nasal operations are not relieved of their symptoms, irrespective of how good the mechanical result or how good the workman. Often this is due to the injudicious choice of the type of operation, and still more often to the injudicious choice of any operation at all. This unnecessary operating is not due to wilfulness or surgical unscrupulousness, but to a lack of knowledge of the underlying cause, and consequent wrong diagnosis.

The majority of rhinologists examine the nose, the sinuses, the ears, the pharynx and the larynx; take a few notes relative to the symptoms; draw a few sketches, graphically recording the deflected septum, the spur or enlarged turbinates, the affected sinuses, the gross pathology of the tonsils, the vocal cord, the arytenoids, the character of the ear drums; run through the functional tests of the ear and there the clinical and physical examinations usually cease. If the complaint is due purely to a mechanical obstruction or an infected sinus such a brief examination may suffice, but often this is not the case, and we may have a nasal obstruction or an infected sinus coincident with an entirely different constitutional ailment, and this ailment may be the cause of the symptoms. Removal of the nasal obstruction or cleaning out the sinus will, of course, have no effect in these cases; because the cause of the symptoms has not been reached. There is about as much reason for operating in these cases and expecting good results as there would be for a syphilologist in excising the chancre and expecting a cure of the syphilitic infection. Therefore, in order to render to the patient the best possible service, to reduce the number of operative failures and to gain the personal satisfaction of a job well done, it is necessary to obtain a complete anamnesis, do a thorough physical examination and employ all the modern laboratory aids at our disposal.

The majority of the chronic cases seen in the clinic or office of the rhinologist present one of four cardinal symptoms, either separate or associated; first, headache; second, tinnitus; third, inability to breathe well, with either an increase or a decrease of nasal secretion, causing either an excessive moistness or an excessive dryness; fourth, a dripping of mucus into the pharynx.

This article is limited to the discussion of the cases of headache and an attempt will be made to distinguish a certain type of headache, which is not at all nasal in origin, but often seen in rhinological practice. This is the pituitary headache due to a disturbance of the secretion of the pituitary gland. This type of headache is recognized by endocrinologists as a diagnostic entity, and should be carefully studied.

The study of the pituitary gland is comparatively recent. Only about thirty years ago the pituitary was still considered a rudimentary organ, a vestige, a nonfunctioning cerebral appendix. In 1889 Marie (1) associated an enlarged hypophysis with acromegaly. About the same time Minkowski (2) in Berlin discovered the same relationship. Then, Howell (3) in 1898 extracted an active secretion from the posterior part of the gland. The anatomy of the gland was described by Swale Vincent (4), who found in it structures similar to the adrenal cortex, the islets of Langerhans, the thyroid, the thymus and the interstitial tissues of the ovaries and testes. Schäfer (5) added to the anatomical knowledge and especially showed the great vascularity of this organ. To this was added the work of Tilney (6) in 1911, which gave a clearer insight into the minute and detailed structure. But it was Harvey Cushing (7) who in 1910 produced his epochal study on the pituitary, who gave us the modern conception of the physiology and clinical manifestations.

To illustrate the headache due to this particular disturbance of the internal secretions I am reporting two typical cases; both of which were referred for treatment of the nose and throat; one in a child, and one in an adult, which will demonstrate the necessity of a thorough general examination and a differential diagnosis before operating on nasal conditions associated with headache.

Case I.—Rosalind M., thirteen years old, complained of headaches for the past two years. A year ago she had a tonsil and adenoid operation, the surgeon telling her that he believed the headache was due to the adenoids. The patient came to us on March 20, 1921, complaining of headache located over both temporal regions and a dull ache over the site of both frontal sinuses. There was no tenderness on pressure. In addition, she complained of shooting pains in her ears.

Upon questioning it was discovered that she felt very sleepy most of the time, being overcome every afternoon with a feeling of lassitude, that she became markedly fatigued on slight provocation, and her school work was not up to the mark. In addition, she had gained thirty pounds in the last eighteen months. She was very shy, blushed easily, and was very sensitive about her weight.

Her family history showed that her father was six feet one inch in height and weighed 210 pounds, her mother was five feet ten inches and weighed 190 pounds, two maternal aunts were about five feet ten inches in height and weighed 180 and 185 pounds respectively. There were no siblings.

The personal history was apparently negative. She was a normal delivery, a full term pregnancy, no instruments had been used, and she weighed six and a half pounds at birth. The only disease she had ever had was measles at three years of age, from which she made an uneventful recovery. As yet she had not menstruated. She began school at six and reached the 6A grade at twelve years with no difficulty, but with the onset of her headaches her schoolwork became poor and she was demoted twice, being at the present time only in the 6B grade, which is one year behind the regular grade for her age.

The examination of the nose showed a straight septum with moderately enlarged inferior and middle turbinates, but plenty of breathing room. The mucous membrane appeared normal. The sinuses transilluminated well. The ears showed a slightly dull color, but were otherwise negative. The interdental spacing was pronounced. The palate was high, narrow and arched. The gums showed no pyorrhea. There was some slight amount of tonsil tissue present at the bases of both tonsillar cavities. The examination of the posterior pharynx showed that there was some adenoid tissue left over. There was no tenderness anywhere on the head.

Physical examination revealed a girl five feet in height, weighing 145 pounds, the adiposity being relatively well distributed. The skin was smooth, delicate, puffed and somewhat dry, with a slight loss of elasticity. The complexion was of the peaches and cream variety. The hair on the head was very fine and abundant. The hands and feet were rather small, the fingers pudgy and the nails thin and small. The fundi were negative. There was no visual field contraction. There was an exaggerated dermographia. Neurological examination was negative. Examination of the heart, lungs and abdominal viscera was negative. The pulse was 62, the temperature 98, and the blood pressure, systolic 104 and diastolic 86.

The urine was negative and the ingestion of one hundred grams of glucose showed no sugar reaction, the urine being examined every hour for six hours. This test was repeated with two hundred grams of glucose with the same result, thus showing an increased sugar tolerance. The Wassermann was negative. Stereoscopic radiographs of the skull showed the sella turcica to be larger than normal and erosion of the posterior clinoid processes. There was no evidence of intracranial pressure and the sinuses appeared to be normal.

In summary, the case presented the typical symptomatology of a perverted pituitary secretion, to which condition Cushing gave the name of dyspituitarism. In this case the symptoms were frontal and bitemporal headache, general lassitude, muscular weakness, small stature, adiposity, delayed menstruation, lymphoid overgrowth, mental retardation, increased sugar tolerance, lowered metabolism shown by the low pulse low temperature, low blood pressure, poorly developed teeth, bones and nails, and the enlarged sella turcica with eroded clinoid processes.

Case II.—Maria F., thirty-five years old, complained of headache for the last six years. Three years ago she had undergone a right middle turbinectomy. This was followed six months later by a submucous resection of the septum. Three months later the left middle turbinate was removed. A few weeks later both maxillary antrums were opened and irrigated daily. This irrigation lasted for two months. At a later period the frontal sinuses were probed, opened and washed. The last operation, fourteen weeks ago, was a complete exenteration of the ethmoid cells and the remaining portion of the middle turbinate on the right side. These operations had been performed by various men, each attempting relief of the headaches and all met with uniform disappointment.

The patient came to us on January 19, 1921, complaining of headache referred to both temporal regions and keenly felt as a constant, boring dull pain in the midregion of her forehead, about three quarters of an inch above the bridge of the nose, which was "way down deep in her nose," to use her own words. Upon further questioning it was brought out that she suffered from drowsiness, numbness of the hands and feet, backache, muscular weakness, loss of strength, marked fatigue on slight provocation, fainting spells, and a rapid gain of weight, gaining thirty-five pounds in the last year. She had begun to menstruate at thirteen years of age, flowed four to five days at a time, was markedly irregular in her periods, sometimes flowing two or four days after her time. At times the flow was scanty, just spotting, and at other times it was copious. It is interesting to note that it was copious when the intermenstrual period was shorter and was scanty when the period was prolonged.

Her family history showed that none suffered from the same or any other special disease. Both of her parents were living and well, one sister died of influenza. So far as could be ascertained, the patient was a normal delivery, a full term pregnancy, no instruments had been used and she had always been healthy, except that she had an attack of scarlet fever, at the age of eight, from which she made an uneventful recovery.

Examination of the nose showed a straight septum, the absence of both middle turbinates and the presence of an atrophic rhinitis. The sinuses transilluminated well with the exception of the right maxillary antrum. The ears showed a slight retraction and a dull color. The landmarks were prominent. The teeth were small and showed a marked horizontal grooving, particularly of the incisors. The interdental spaces were wide, several molars were missing, but those present were in good condition. The palate was of moderate height and width. The gums showed no pyorrhea. The tonsils were small and cryptic, but showed no evidence of infection. There was therefore nothing in the ear, nose and throat to account for her headaches. Practically everything had been done, but the headaches still persisted.

A regular physical examination showed a woman, thirty-five years of age, who was five feet three and a half inches in height, and weighed 190 pounds. The adiposity was uniformly distributed. The skin was smooth, delicate, but somewhat dry and flabby. The hair on the head was very fine, silky and abundant. The eyebrows were bushy and the eyelashes were thick. There was a slight amount of hirsuties on the upper lip. The chest and abdomen were covered with a fuzz of hair. The pubes showed the masculine vertical distribution, the hair extending to the umbilicus, forming a pyramid on the lower abdomen instead of the usual female distribution limited to the mons veneris. The hands and feet were small, the fingers short and stubby, the nails thin and small. The sexual apparatus was normally developed, but the patient revealed a lack of erotic emotionalism, taking no interest in intercourse, participating in the act as a marital duty. The fundi were negative. There was no visual field contraction. The cranial nerves were intact. Neurological examination was negative with the exception of a pronounced dermographia. Examination of the heart, lungs and abdominal viscera revealed no abnormalities. The pulse was 65, the temperature was 98.4 and the blood pressure; systolic 108, diastolic 90.

The urine was negative and the ingestion of two hundred grams of glucose showed no sugar reaction, the urine being examined every hour for six hours. This test was repeated with three hundred grams of glucose and the same result was obtained, showing an increased sugar tolerance. The blood examination showed: hemoglobin 80, red blood corpuscles 4,200,000; while corpuscles 6,000; differential: polymorphonuclears 63, small mononuclears 32, enlarged mononuclears 5. The Wassermann was negative. Stereoscopic radiographs of the skull showed a small sella turcica, and the clinoid processes were bridging over and almost meeting. There was no evidence of intracranial pressure. The frontal sinuses, the sphenoidal sinuses, the temporal sinuses and the right maxillary sinus appeared normal, the left maxillary sinus was clouded.

In summary, this patient also presented the typical dyspituitary symptomatology, in this case consisting of deep frontal and bitemporal headache, muscular weakness, drowsiness, fainting spells, small stature, general hypertrichosis, disturbed menstruation, decreased sexual desire, increased sugar tolerance, lowered metabolism shown by the low pulse, low temperature, underdeveloped teeth, bones and nails, and the bridging clinoid processes with the small sella turcica.

The treatment of the headache in both of these cases was a simple matter for the treatment of dyspituitarism is specific, and the specific is the pituitary gland. Cobb (8) uses in addition the extracts of other organs, for often when one endocrine organ is affected, the other endocrine organs are involved, producing Timme's (9) polyglandular syndrome. Beck (10) reported four cases of hypophyseal disturbance, and in addition a large number of hypothyroid cases, twenty per cent. of which showed hypopituitarism and nearly all of which showed hypovarianism. He employed with successful results hormotone, which contains all three substances, pituitary, thyroid and ovarian extracts. Pardee (11) reported seven cases of pituitary headaches, which responded to treatment using pituitary extract alone.

The dose of pituitary extract is an individual problem; there is no ordinary average dose. Some patients will thrive on a grain daily, while others may need three hundred, as in one of Cushing's cases. Cushing (12) proposed that the rational dose "be determined by giving the individual daily an amount of glucose sufficient to produce a temporary mellituria in a normal individual of equal body weight; meanwhile an increasing amount of the extract is administered daily, until under the condition of the increased carbohydrates toleration which the patient develops, hyperglycemia occurs with a trace of sugar in the urine." This method is rather too complicated for ordinary clinical use, and the best way is to begin with a small dose, increasing gradually, meanwhile using as a guide the increase in blood pressure. There are three routes by which pituitary extract may be given. Maranon and Rosique (13) reported the case of a bullet wound in the midfrontal region which developed Froehlich's infantilism and was greatly benefited by the injection of pituitary extract. However, in our cases we have rarely had recourse to hypodermic medication.

In the first case, treatment was begun with one and a half grains of pituitary extract, three times a day, by mouth. This was increased by half a grain three times a day, until finally fifteen grains daily was given. This last dose was sufficiently large, for with this dose the headaches were controlled. On cessation of the extract the headaches reappeared. On continuing the extract the headaches stopped again. At the present time the girl has no headaches and has lost ten pounds in weight.

In the second case presented, in order to eliminate the left maxillary antrum which was cloudy and therefore a possible etiological factor, the trocar and cannula were introduced, the antrum was irrigated, but it was found to be clear. This is not an unusual condition. Quite often when the x ray of the maxillary antrum shows a shadow, no pus is obtained upon irrigation. The patient was given the pituitary by mouth, beginning with four grains of the extract daily. This was increased to six grains, then to eight grains and finally to nine grains. This last dose was sufficiently large to control the symptoms, for in four weeks the headaches stopped. As in the first case when the extract was stopped the headaches reappeared and on continuing the extract the headaches stopped again. This patient in the last six months, in addition to having been relieved of her headaches has lost six pounds. Her blood pressure has risen to systolic 118 and diastolic 96. Her pulse is full and bounding, and about 70. She is more active, the fainting spells have ceased and she feels rejuvenated.

Now, even he who runs can read that these headaches were anything but nasal in origin, that they were part of the general picture of dyspituitarism and that all the nasal operations were useless.

In concluding I wish to emphasize the fact that there is a definite, distinct type of headache—the pituitary—which is met quite often in rhinological practice; that this headache is due to a disturbance of the secretion of the pituitary gland; that it may exist coincident with nasal pathology; that it is entirely independent of this pathology; that it is not relieved by nasal operations, but responds to specific endocrine medication and finally that in order to diagnose this type of headache and render proper treatment, thus eliminating unnecessary operations it is absolutely necessary for the rhinologist to obtain a complete anamnesis, do a thorough physical examination and employ the laboratory aids requisite.

REFERENCES.

1. Marie, P.: L'Acromegalie Nouv, *Icon. de la Saltpetriere*, 1889, vol. iii, p. 1597-1581.
2. Minkowski: Ueber ein Fall von Akromegalie, *Berl. klin. Wchnschr.*, 1887, p. 371.
3. Howell: *Journal of Experimental Medicine*, 1898, vol. iii, p. 245-258.
4. Vincent, S.: *Practitioner*, 1894, vol. i, p. 149.
5. Schäfer, E. A.: *The Endocrine Organs*, p. 77.
6. Tilney, F.: *The Pituitary Gland*, Mem. Wistar. Insti., 1911.
7. Cushing, H.: *The Pituitary Gland and Its Disorders*, 1912.
8. Cobb, J. G.: *The Organs of Internal Secretion*, p. 108.
9. Timme, W.: A New Polyglandular Syndrome, *Endocrinology*, 1918, vol. ii, p. 1918.
10. Beck, H. G.: Fat Redistribution in the Hypophyseal Type of Dystrophy Adiposogenitalis, *American Journal of the Medical Sciences*, 1918, vol. civi, p, 711, 720.
11. Pardee: Pituitary Headaches and Their Cure, *Archives of Internal Medicine*, 1918, vol. cxxii, No. 2.
12. Cushing, H.: *The Pituitary Gland and Its Disorders*, 1912, p. 317-318.
13. Maranon, G., and Rosique, A.: Contribucion clinica y experimental al estudio de la accion de la hypofisis sobre la diuresis, *Treb. de la Soc. Biol.* (Barcelona), 1917, vol. xixx, p. 126.

231 East Eleventh Street.

PRINCIPIA THERAPEUTICA.*

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(Concluded from page 303.)

Thorough knowledge of pharmacology is valuable, but in the present light of the science it is not everything, nor is it likely to be for some years to come. There is not one of my readers who will deny the great value of potassium iodide as a remedy, and yet there is nothing in the action of that drug, as studied experimentally, that gives us anything like a conception of the benefits to be derived from it in the cure of disease. Moreover, continuing with the same drug, as an illustration, literature has not impressed the profession concerning the indications for the small and large dose. The modernist is good, but he is not infallible. Sollman in his materia medica, published in 1901, says in most positive manner that mercury is useless in the first and third stages of syphilis. How does such an assertion stand today? I believe in modernism so long as modernism produces a positive finding one way or another. But I doubt modernism when it knocks props from under us, without replacing them with some other means of support. Aconite is to my mind a valuable remedy in its sphere, and yet a modern writer has made himself responsible for the opinion that it is so useless that it should be dropped from the list of drugs. I might mention other remedies of which the same might be said, but time forbids.

H. C. Wood, Jr., has recently said, when condemning empiricism, that all prescriptions should be based upon some relationship between the action of the drug and the features of the disease, that he did not care what that relationship was, so long as it was a reasonable one. Studying the question thoughtfully we are forced to admit that in every instance we must decide upon a prescription based upon the known action of the remedy and the clinical features and pathology of the illness. Whatever that reason may be, we must admit also that fundamentally there must exist an antagonism of the remedy to the disease. The antagonism may not be apparent but it is there or the illness cannot be cured by the remedy. The selection of a drug then must be made for reason.

Now let us think what possible reasons there are in a prescription. Let us also consider that the symptoms which we utilize in making a diagnosis are not by any means always the symptoms to which we direct our remedies; for example, sleeplessness may have no bearing on a diagnosis and yet may constitute part of the vicious circle which keeps the patient ill. The sleeplessness may be temperamental and not a part of the disease at all, but we may cure that patient by attention to his insomnia only. Numerous other example might be instanced.

The possible methods of deciding upon treatment are fairly numerous and may be applied according to indications in individual instances. Reviewing this statement shows that the subject is by no means a simple one, for in any given case we may be forced to consider a variety of factors. Take, for example, the question of rest which we know is the greatest restorer of all. Drugs may be used to secure this, but again, not carelessly but with discrimination, according to the cause of that loss of rest; for example, in cardiac decompensation, with its terrible respiratory distress, with a vicious circle moving at times so rapidly as to threaten destruction, morphine and morphine only brings the needed rest to the laboring heart through subjective relief of the dyspnea.

A prescription may be made on an etiological basis, as when we use castor oil for clearing the intestines of irritant materials. It may be mechanical, as when we use atropine to get the iris out of harm's way in cases of iritis.

We have numerous examples of germicidal therapeutics for local application, of which ammoniated mercury in impetigo furnishes an excellent instance. On the other hand, antiseptic internal medication is thus far depending in its results, reasonable though it may appear to be, on but a superficial view. It would seem, however, that there may be certain types of antiseptic medication in which the virulence of the infection may be lessened by a partial protection of the human organism, thus enabling the defensive organism of the body to control the balance.

Drugs may be prescribed on an allopathic basis. This is a most unfortunate term as it does not signify really anything beyond the fact that the drug must have some action in a different direction from the disease, not specifying what direction it shall take, therefore not getting us anywhere and seldom used in thought by any of us. Antipathic, which means the direct opposite, has to be interpreted with judgment; while there are numerous symptoms which have their antitheses, there are many more which fail in that capacity unless we consider that their opposite may be health. Isopathy, a term used to signify the cure of the disease by the administration of the morbid product of that disease, is akin to the modern autotherapy. It is in no sense, to my way of thinking, analogous to the modern serum treatment of disease. Most writings on this subject are essentially crude and appear to ignore modern pathology. The homeopathic relationship is based upon a similarity of the symptoms or pathological disturbance with the action of the drug; for example, Byrom Bramwell proposed arsenic as a remedy for pernicious anemia, because arsenic in long continued administration produces a fatty degeneration and in pernicious anemia fatty degeneration is one of its characteristic pathological changes. We all of us use ipecac and morphine as remedies for vomiting. X rays sometimes produce and sometimes cure carcinoma of certain types. Modern procedures in bacteriotherapy and serotherapy are corollaries of the homeopathic doctrine.

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*Read before the West Philadelphia Medical Association, March 22, 1921.

Then there is the specific medication concerning the action of which discussion has been rife for decades. As good examples of this class may be mentioned quinine in malaria, sodium salicylate in certain types of rheumatic fever, and iron in chlorosis. The curative actions in these three instances occur so regularly that one is justified in questioning his diagnosis in the face of therapeutic failure.

Endocrinology is a comparatively new science and is acquiring an increasing importance in both diagnosis and therapeutics. A correct endocrinous diagnosis leads to a correct therapeusis in the suitable cases. The application of the remedy to the diseased state is never a matter for careless study, for, in the majority of cases, the endocrinous disturbance is not a simple one. Several disturbances of functions of internal secretion are likely to exist in the majority of cases. These may take the direction of deficiency in one, alteration in another, and a deficiency in the case of still a third endocrine gland. The selection of the proper secretion is therefore a rather complicated matter, and the regulation of the dose no less so.

Having decided upon what is the proper treatment in a given case, the physician should under no circumstances depart from his original plans without having an excellent reason for doing so. In a measure, the result of therapeutics must be accepted as aiding or modifying a diagnosis. If the treatment follows the schedule expected, then all goes well. If the treatment fails to modify the disease, as expected, then it is time to change the therapeutic procedure, not, however, in haphazard or empirical fashion, but after a reexamination of the clinical data to determine if we have been in error at any point. Though the patient does not progress so favorably as we expected or desired, if examination and reexamination still go to show that the treatment is the best or the most rational, we should not discard it for one less reasonable and therefore offering a smaller prospect of a good result. Let me illustrate: At a consultation several years since, it was very evident that the treatment and conduct of the case by the attending physician was beyond adverse criticism at any point. The prognosis, of course, was unfavorable, the patient being seventy-eight years of age, unfavorable by the very nature of the illness. An opinion was given to the doctor in accordance with these facts, and he was advised to make no change whatever, because such change could not produce a treatment more appropriate than that which he was giving. He appreciated the advice and remarked that consultants were expected to make a change of treatment if for no other reason than to justify their attendance in the case. Notwithstanding the apparent hopelessness of the case, after an illness of three months the patient made a complete recovery.

Numerous times does one observe a well planned treatment instituted at the onset, then, because of an unreasonable desire to hurry things along, treatment is changed and the patient does not progress so favorably as before. Doctors are often placed between two lines of critics. If he changes his treatment daily, he is said to be wobbly and have no definite ideas, while another set of critics will say that he is watchful and versatile. Again he institutes a plan of treatment to which he adheres most rigidly. He will be praised by some as having a positive personality and the courage of his convictions, while other observers will say that he has done nothing for the patient since the first day. And so it goes.

An error that I have often noted as being widespread among physicians is that of failing to follow exactly the scheme of the originator of a therapeutic idea: for example, Sippy complains that alleged failures in instituting his ideas in the treatment of gastric ulcer show a disposition to make modifications that alter the plan beyond any possible recognition. I have furthermore observed that the Allen treatment for diabetes, as applied in practice by many physicians, could never pass muster even as a modification, and so I might speak of the several other dietetic methods of managing diabetics. The Willms treatment of bichloride poisoning is nullified entirely by the use of normal saline intravenous infusion along with the calcium sulphide and furthermore by a desire to make assurance doubly sure of using egg albumin as an additional antidote. If Willms's treatment is properly followed, I believe that in all cases of poisoning, in which less than twenty grains have been taken, recovery will take place. With the alleged improvements, the result is doubtful. In other words let us take to heart the old adage translated, "Follow me but follow me exactly"; then and then only has one a right to speak with authority concerning a therapeutic proposition.

Human fallibility is such that it is scarcely possible for any one to discuss such a wide subject, as that presented by me, at so great and yet at inadequate length, without error and most certainly without mentioning matters concerning which many will have decided convictions contrary to those stated. If I have awakened in your minds a train of thought that will get away from haphazard methods and lead to prescribing after a systematic clinical study of patients, and a desire for quantity rather than quality of work in medicine, I will feel myself amply repaid for the time spent in the preparation of this article.

1435 Spruce Street.

Proceedings of Societies

NEW YORK NEUROLOGICAL SOCIETY.

Three Hundred and Nineteenth Regular Meeting, Held at the Academy of Medicine, October 4, 1921.

The President, Dr. Foster Kennedy, in the Chair.

Evidence of Nervous Control of Some Internal Secretions.—Dr. Walter B. Cannon, of the Harvard Medical School, Boston (by invitation), presented this paper illustrated with numerous lantern slides. He said that his interest in the control of internal secretion began years ago in the observation that emotional excitement inhibited the movements of the stomach and intestines. This inhibition was due to sympathetic impulses. The question arose as to whether the adrenal medulla, which was also innervated by the sympathetic, and whose output, adrenin, mimics sympathetic action in the body, was likewise caused to secrete during emotional stress.

EVIDENCE FOR NERVOUS CONTROL OF THE ADRENAL MEDULLA.

The first evidence in answer to this question was given by himself and de la Paz in 1911. An intestinal strip rhythmically contracting in oxygenated ringer's solution was promptly inhibited by minute amounts of adrenalin. It was likewise inhibited by blood removed from the inferior cava in the neighborhood of the lumboadrenal veins, if the blood was taken during or immediately after excitement, but was not inhibited by blood taken from the same region before excitement. The conclusion was drawn, therefore, that the adrenal medulla discharged into the blood stream its peculiar product, adrenin, in periods of emotional stress. Later he and Hoskins showed that asphyxia and afferent stimulation, both of which were known to cause discharge of sympathetic impulses, would likewise induce extraadrenal secretion. The evidence thus adduced had been confirmed by various observers using various methods.

The results and the methods leading to the conclusions just mentioned had been criticized by Stewart and Rogoff. They had declared that the output of adrenin from the adrenal glands was not increased by asphyxia, by reflex stimulation, or by excitement, indeed that the secretion was constant and unchangeable. Furthermore, they urged that it was impossible to judge whether the secretion was increased or decreased unless the rate of blood flow was known.

Dr. Cannon said we would defend the method that had been employed, though it could be defended by use of recent evidence that the blood flow in the inferior cava was, in fact, increased under the conditions cited, so that the tendency would be not to concentrate a constantly secreted adrenin, but rather to dilute it. In other words, the conditions of blood flow were unfavorable to the result which he, with de la Paz and Hoskins, had actually found. Instead of elaborating this defense, he wished rather to speak of the use of the denervated heart as an indicator of adrenal secretion. In this preparation both vagus nerves were severed, the stellate ganglia were removed, and the heart itself, separated from the central nervous system, remained in the body performing its function, but no longer subjected to any influences except those brought by the blood stream. The heart thus isolated was extraordinarily sensitive to circulating adrenin. Though very stable in its rate, it could be made to beat faster by thirty, forty or fifty beats a minute, by inducing asphyxia or reflex stimulation or excitement. Such increases, in our experiments, did not occur or were relatively slight if the adrenal glands were removed. The same conclusion was drawn, therefore, that was drawn from the earlier experiments, that the three conditions just named induced a secretion of the adrenal medulla.

Again, the evidence had been criticized by Stewart and Rogoff. They repeated the experiments with the denervated heart and found that in certain instances they were able to obtain a marked increase of rate though the adrenal glands had previously been removed. Examination of their results showed that the order of increase of the two conditions was as a rule very different. The heart rate was on the average increased approximately thirty beats a minute if the adrenal glands were intact, whereas the increase was only six beats a minute after their removal. Nevertheless there were instances of much larger increases than the average of six beats, and these cases must be accounted for.

In experiments in cooperation with Rapport, Dr. Cannon said he had found that the increase could not be explained by increased blood pressure, arterial or venous, by warmer blood from the abdomen, or by accessory adrenal tissue. It disappeared, however, on severance of the hepatic nerves. For the present the matter might be left at this point, as it was understood that after cutting these nerves reflex stimulation or stimulation of an afferent nerve would produce a pure adrenal effect.

In explanation of the faster heart rate when the adrenal glands were present and an afferent nerve was stimulated, Stewart and Rogoff suggested that such stimulation by constricting the splanchnic area induced a "redistribution of blood in the body," with consequent concentration of the uniformly secreted adrenin which thereby became more effective. This suggestion had been put to test. By use of a "reduced" animal (i. e., one with both carotid, both brachial and both renal arteries tied, the aorta closed below the renals and the mesenteric nerves cut) vascular reflexes were reduced to a minimum. The liver was excluded and the adrenals were the only abdominal viscera left innervated. Typical reflex accelerations of the denervated heart averaging twenty-six beats a minute occurred in this preparation, although the changes of blood pressure were insignificant or were only moderate variations either up or down. Under these circumstances the more rapid beat could not be attributed to a redistribution of blood in the body, for the possibilities of redistribution were lacking.

Another test consisted in substituting a stream of adrenalin to replace adrenal secretion after removal of the glands. In this test adrenalin at the rate of approximately 0.0007 mg. per kilo a minute was injected by vein continuously to replace the continuous unvarying adrenal secretion assumed by Stewart and Rogoff to be normal on the basis of a test made inside the body. Typical vascular reflexes were now induced by afferent stimulation, but either no acceleration of the pulse occurred or an insignificant increase of two beats a minute. Again the evidence was clear that the faster rate was not due to redistribution of blood in the body.

Stewart and Rogoff had urged that their method was superior to all others in being quantitative. Dr. Cannon said that they had found that the denervated heart in the "reduced" animal could be employed as a means of assaying adrenin. Repeated equal doses injected intravenously at a uniform rate repeatedly produced in a given animal the same or nearly the same maximum increases of heart beat, and if the injections differed in rate the increases likewise differed in degree. When the circulation was thus simplified the acceleration was wholly or chiefly dependent on the rate of injection, and was little, if at all, influenced by variations in blood pressure. By matching adrenalin injections with reflex adrenalin secretion it had been shown that when the heart rate was accelerated between thirty and forty-two beats a minute, the output from the adrenal glands was between 0.0032 and 0.0037 mg. of adrenin per kilo a minute, i. e., more than ten times the amount regarded by Stewart and Rogoff as the unvarying normal secretion, when they removed blood and assayed it for adrenin outside the body. Stewart and Rogoff had not explained the discrepancy between their figures for the internal and the external test for adrenal secretion.

From the foregoing evidence it may be concluded that the results of our earlier work had been justified and that the inferences drawn from it that adrenal secretion was evoked by asphyxia, by reflex stimulation and by excitement, were also justified.

EVIDENCE FOR NERVOUS CONTROL OF THE LIVER.

It will be recalled that the denervated heart might be made to beat faster on afferent stimulation though the adrenal glands had been removed, and that this effect was abolished by severance of the nerves to the liver. The inference was drawn, therefore, that some agent arising in the liver was the occasion for the faster rate. Dr. Cannon said that he, Uridil and Griffith had shown that stimulation of the hepatic nerves themselves would cause an increased rate of the denervated heart, an effect appearing slightly later than the similar adrenin effect and lasting for a longer time. Furthermore, stimulation of the hepatic nerves would cause a rise of blood pressure. This was not due to a retarded blood flow through the liver, for it did not occur on closure of the hepatic artery and vein. Furthermore, it did occur on hepatic stimulation though all the abdominal viscera had been removed except the liver, and unlike the stimulation of splanchnic bloodvessels alone it long outlasted the period of stimulation.

The increments of heart rate varied widely. They were slight if the animal had been fasting or was in poor condition. They were much greater if the animal was digesting meat. These conditions could account for the discrepancies between Stewart and Rogoff's results and those reported by Dr. Cannon and his collaborators as a consequence of splanchnic or reflex stimulation after removal of the adrenal glands. The inference was drawn, therefore, that a substance was given off by the liver into the blood stream which, carried to the denervated heart, raised its rate.

None of the products of hepatic activity when injected into the blood stream had the effects produced by exciting the hepatic nerves. Furthermore, the efficacy of hepatic stimulation in causing a faster heart rate when meat was being digested was not seen in an animal which was digesting carbohydrate or fat, or which had been fed for several days on either of these foodstuffs. On the other hand, stimulation was more effective after amino acids had been injected into the intestines. For the present, he said, they were inclined to draw the conclusion that probably the effects noted were not due to a true internal secretion produced by the liver, but to a discharge from its cells of amino acids or amines, which were sympathomimetic in character.

EVIDENCE FOR NERVOUS CONTROL OF THE THYROID.

Histologists have described nonmedullated nerve fibres reaching to the cells of the thyroid gland. Anatomists have found that fibres going to thyroid gland arose in cervical sympathetic ganglia. It had been shown that severance of its cervical sympathetic nerves would cause atrophy of the thyroid and that stimulation of these nerves would cause a diminished iodine content of the gland. In 1916, in cooperation with Catteli, Cannon pointed out that if the thyroid and neighboring indifferent tissue were connected through a galvanometer, stimulation of the cervical sympathetic cord evoked an active current after a latent period varying between five and seven seconds, an effect which persisted after the superior and the recurrent laryngeal nerves were severed. This did not occur if the main trunk of the vagus was stimulated, or if pilocarpine, which was an excitor of vagus endings, was injected. The effect could not be attributed to the shutting off of the blood supply by vasoconstriction, for total anemia produced by clamping the carotids for a period equal to that of sympathetic stimulation produced no noteworthy electrical changes in the gland. From this evidence the conclusion was drawn that the nerve fibres distributed to the thyroid cells belonged to the sympathetic and not to the cranial division of the autonomic system, and since their effects were not indirect through alterations of blood supply, they were indeed true secretory nerves.

The electrical evidence given above was confirmed by the experiments of R. L. Levy in the Harvard Physiological Laboratory in 1916. He made use of the fact that if thyroid substance was introduced into the blood stream standard doses of adrenalin injected intravenously would cause a greater rise of blood pressure than they caused previous to the administration of thyroid. He found that after stimulation of the cervical sympathetic there was indeed a greater effectiveness of the adrenal injections amounting in some instances to as much as two-hundred to three hundred per cent.

Since adrenalin will mimic the action of sympathetic impulses it was to be expected that adrenalin itself would stimulate the thyroid. This Levy found to be the case. Stimulating doses of adrenalin caused a greater effectiveness of the repeated standard doses (which were very small). If the thyroid glands had previously been removed, however, both cervical sympathetic stimulation and adrenalin injections failed to produce an increase of the response to the standard doses. Levy proved that stimulation of the cervical sympathetic caused the thyroid to secrete promptly. Removal of the thyroid gland immediately after stimulation was followed by an increase of the efficacy of the standard doses similar to that observed when the glands were left in the animal throughout the course of the experiment.

The method used by Levy involved destruction of the upper part of the central nervous system. This procedure did not permit tests to be made on the effects of such stimulation as would in the conscious animal be accompanied by sensations of pain, nor upon the influence of asphyxia. It was desirable to have another method, therefore, which would permit such tests as these to be made.

In 1920, in cooperation with P. W. Smith, Dr. Cannon said he made use of the denervated heart as an indicator of thyroid activity. If the temperature of the animal was kept uniform and the ether anesthesia was likewise maintained at a fairly uniform level, the heart rate did not vary more than a few beats a minute through several hours of observation. With the denervated heart they found that gentle massage of the thyroid gland for two or three minutes would cause an increased rate amounting in some instances to thirty-three per cent. over the basal rate. The development of the maximal increase was usually slow, requiring from thirty to sixty minutes and passing off in a similarly slow manner. Massage of another gland, for example, the submaxillary, did not cause this effect, and massage of the thyroid would cause it even though the adrenal glands had previously been removed.

They found that stimulation of the cervical sympathetic trunk would induce a similar increase of the rate of the denervated heart, but that this did not occur if the thyroid gland had previously been removed on the stimulated side. Reflex stimulation of the sciatic or brachial nerve, such as would cause sympathetic impulses to be discharged, had the same effect as direct stimulation of the cervical trunk, but with the addition that there was a primary acceleration of the heart due to adrenal discharge. This was followed by the same slowly developing thyroid effect. Asphyxia, likewise, had the same influence. On the other hand, if the thyroid glands had been previously removed sensory stimulation and asphyxia induced only the increased rate due to adrenal discharge.

The foregoing evidence—electrical, cardiac and vascular—was harmonious in testifying to a control of the thyroid through the sympathetic strands in the neck. By connecting the phrenic nerve with the cervical sympathetic and waiting until the phrenic fibres had grown out to the distribution of the sympathetic fibres they had been able in a certain percentage of cases to produce many of the phenomena of hyperthyroidism. When this operation was done, there would be discharge to the distribution of the cervical sympathetic nervous impulses with every respiration. Thus, nerve filaments affecting the thyroid would be continuously excited by normal impulses from the central nervous system. In animals which showed indications of hyperthyroidism there was an increased heart rate running up from the normal, which in the cat was approximately 150 beats a minute, to 225 and even 250 beats a minute. The character of the animal changed from that of a quiet affectionate domestic pet to that of a furtive creature running away from anyone entering the room. There were loose movements of the bowels without evidence of fermentative changes. The skin of the neck and head became thickened in spots, and there were patches of alopecia. The most characteristic alteration, however, was a very great increase in metabolism. In one of the animals the increase of the metabolic rate was 125 per cent. Removal of the thyroid gland on the operated side restored the animal in which the metabolism had been greatly increased to a rate which was within the normal range of variation.

THE NATURE OF THE NERVOUS CONTROL.

Thus far evidence had been adduced that adrenal secretion, an output of a stimulating material from the liver, and likewise thyroid secretion, were all subject to sympathetic impulses, i. e., to the activity of that part of the nervous system which was roused in great excitement. It was important to know where the reflex centre for this activity was and whether the control of the organs above mentioned was double as in the case of the submaxillary gland (chorda and sympathetic), or single like the biceps, for example, with inhibitory or excitatory impulses affecting the central station.

Dr. Cannon said that answers to these questions had been found for the adrenal medulla in experiments performed by himself and Rapport. They had observed that reflex acceleration of the denervated heart could be evoked after removal of the cerebrum and the corpora quadrigemina. A transection a few millimetres back of these bodies destroys the reflex. Removal of the adrenal glands (without a fall of blood pressure) lessened the rate of the denervated heart. Under experimental conditions, therefore, a continuous adrenal discharge was going on. Using this as a basis they had regarded slowing of the rate of the denervated heart in consequence of stimulation as being due to diminished adrenal secretion. Such slowing occurs when the central end of the vagus or of the depressor nerve was stimulated in the cat. It might be as much as twenty-four beats a minute and appeared even after the corpora quadrigemina and all parts anterior to them had been removed. It failed to appear when the brain stem was severed a few millimetres back of the corpora and likewise after the adrenal glands had been exercised. They concluded, therefore, that the reflex centre for adrenal secretion was located near the upper or front edge of the floor of the fourth ventricle and that was subject to both excitatory and inhibitory nervous influences.

The evidence just adduced placed the control of adrenal secretion in a part of the primitive nervous system. It was interesting to note that this region was in close approximation to that which appeared to be concerned in emotional expression. Sherrington and Woodworth were able to call forth pseudoaffective reflexes in the cat after ablation of the hemispheres and the thalamancephalon, and Goltz likewise noted many evidences of emotional expression (snarling, snapping etc.) in a dog from which the cerebral cortex had been removed. Head and Holmes, because of clinical studies, were led to the conclusion that the thalamus in man was concerned with the affective side of sensation. It appeared, therefore, that the emotional reactions of animals were not managed in the neopallium but were ingrained in an archaic portion of the nervous system. Possibly it was for this reason that the expression of emotions was so similar in widely different animals, such as the cat or the dog, and man. The fact, however, that such was the case permitted the use of lower animals in an analysis of conditions accompanying emotional outbreaks and justified the expectation of finding similar conditions and a similar analysis in human beings. The great interest of study along lines here hinted at lay in the association of primitive and archaic reactions occuring in an ancient portion of the nervous organization of the body and operating upon an elementary form of the nervous system (the sympathetic) with the functions of organs which were fundamentally important for the organism, the ductless glands.

DISCUSSION.

Dr. **Frank H. Pike**, of Columbia, said that it had long been recognized that the production of an electrical current was an invariable accompaniment of the processes of living matter. Walter had gone so far as to characterize the production of electrical current as a sign of life. Whenever a gland secreted, whenever a muscle contracted, there was an electrical current produced; and today wide clinical application was made of the fact that the heart produced an electrical current; that this current could be led off and its variations measured with precision. The minute changes in the heart were judged merely by its electric cardiogram.

Dr. Pike said that there could be no question that a change in electrical condition of a gland or muscle indicated some change in its degree of metabolism.

With regard to the adrenals, Dr. Pike said he was frankly puzzled. It seemed to him a strange fact that Dr. Cannon, beginning with a study of the intestine, should find that the root led back to the nervous system. It seemed perhaps strange that for himself, beginning with the study of the central nervous system, he should somehow or another get into this adrenal mixup. Yet, such was the case. Some years ago, he said, he and Dr. Stewart tied off the bloodvessels to the brain of a cat. They got a vigorous response. This tying off of the bloodvessels to the brain, of course resulted in total failure to function. After a time the animal lay as if dead. If artificial respiration was kept up, the heart and the other part of the system was open, so that the head was the only part deprived of oxygenated blood. It did not do the cat much harm to kill it; in fact, they killed it several times. They found that this procedure of tying off the bloodvessels for three or four or five minutes, whatever was necessary, restoring of circulation, getting the cat back again, could be repeated as often as eighteen times. The cat seemed to be very resistant. Yet, to all appearances, this was a pretty severe procedure.

It was noticed, however, that as the cat was subjected to these successive insults, that the blood pressure curve began to show some differences. At first there was simply the curve rising, a little dip in it, and another rise, and another fall. It was plainly enough one curve. But after these bloodvessels had been tied off, say, ten or twelve times, or eight or nine times, depending upon the cat, they began to find a notch in the top of that curve; there was a partial drop in that blood pressure, then it came back again, and they got a final fall. Towards the end of this series they found that the blood pressure rose pretty sharply and fell perhaps down to its normal level and again rose. They got this curve breaking up in two; it was pretty symmetrically divided in point of time, but a repetition of this process for three hours did not suffice to kill the cat.

The chance observation that the blood did not clot very readily in such a cat made them suspect that the adrenals might be involved here, so they tied the adrenals off. There was no particular change in blood pressure when this was done, but the picture subsequently was rather different. In some cats, immediately after tying off the adrenals, simply tying of the bloodvessels once was sufficient to curtail this response by about fifty per cent. There is simply the sharp rise and the blood pressure falls, say, within half the time occupied by the control. Sometimes four or five conclusions were necessary, but invariably the animal died; they found that it was impossible to bring it back, after this procedure had been employed a few times. There was something in the adrenalin which was extremely necessary for this relationship between smooth muscle and sympathetic nerve. Professor Pike said he had an idea that without the adrenals, neither people nor animals would be able to stand nearly as much as they do in this world. It seemed rather important that this survival time of an animal could be shortened after the removal of its adrenals, say, to a period of fifteen minutes and not have to wait twelve or twenty-four hours for it to die. The longest time any of them had survived was a day and a half.

Dr. **Walter Timme** said that first of all, he would like to ask if the stimulation of the sympathetic nervous system or a portion of it, or of a peripheral nerve, would produce an increase in the adrenalin content of the blood. That was granted. Secondly, if it was granted that adrenalin in the blood stimulated the sympathetic nervous system (and he thought that had been proved) they were immediately confronted by a condition of unstable equilibrium in which adrenalin stimulated the sympathetic, the sympathetic stimulated the adrenalin production, and so on with a constantly increasing production of adrenalin, until finally, if the production went on *ad infinitum*, exhaustion would ensue. There must, therefero, be an inhibitory centre which automatically must bring that process to cessation, or else all would succumb; as a matter of fact, in certain instances some did succumb to the stimulation of the adrenal medulla by means of thyroid activity. The administration of thyroid in a susceptible individual would produce syncope due, in all probability, to exhaustion of adrenals through that administration.

Dr. Cannon had explained that the centre for these reactions was probably in the thalamic region. That perhaps was the old brain centre of effective motor control. There must be a higher centre in the brain which, through its stimulation and its emotions, controlled this lower centre, and, although Monakoff had not definitely pointed out such pathways, he wondered whether since his time physiologists such as Cannon had had any experience in their laboratory with the physiology of those pathways.

Dr. Pike had made the statement, which had been made previously a number of times, that the activities of all organs, and especially of the internal secretory glands, could be enhanced or produced not only by one method but by many. That, he said, led him to this statement which he would like to make: That a great deal of the outpouring of adrenalin and of thyroid secretion was perhaps not due to nerve current at all but to direct massage, just as he explained, experimentally, it could be produced. Deep breathing, ordinary respiration, with the movement of the diaphragm downward, compressing the abdominal organs, in itself had the mechanical and physical effect of producing and of releasing into the circulation a certain amount of adrenalin. So that massage (physical causes, as well as electrical ones) would suffice to produce the secretion.

Then there was a third one, a direct chemical effect, as had been shown a number of times, he believed, especially in the frog's heart removed from the body. A frog's heart removed from the body would beat rhythmically for a certain number of hours, if properly maintained in the proper fluids; but if a little thyroid solution was added to that, the number of hours in which that frog's heart would beat rhythmically would be enormously increased. The direct chemical effect, therefore, beside the physical and the electrical, was an element of the production of the internal secretory flow into the circulation.

Dr. Israel Strauss said he would like to ask a question also. Dr. Timme had made a statement that in cases of certain individuals, if large doses of thyroid were administered syncope might result, and that that was due to extra excretion of adrenalin, due to exhaustion of adrenalin. Was there any physiological proof of that? In other words, he said he had noticed that Dr. Cannon had shown on his charts that when adrenalin was introduced, the activity, through thyroid, was increased. He believed that was what the chart showed. But he had not shown whether increased administration of the thyroid had any effect upon the adrenal. It was just such physiological facts that were necessary to clinicians before they could deduce from the clinical observations anything that could rely on physiological function. He believed it was that lack in some cases (if it was a lack) in our treatment of the glands of internal secretion in clinics, and in therapeutists' efforts in these cases where it was assumed there was a disturbance of internal secretion, of physiological basis or of facts proved by physiologists, that had provoked criticism in some quarters.

Dr. Stewart Paton, of Princeton, said he thought Dr. Cannon did not need to be reminded that they had an excellent opportunity of studying these archaic reactions in the embryo of all the higher vertebrates. He felt that his opportunity had come, because he had been repeating for a number of years that somebody with Dr. Cannon's capacity for conducting experiments should try and correlate the functions of the embryo in relation to the development of the nervous system. As he had said before, first the thyroid came into the circuit and then the adrenal; and he was much interested to hear Dr. Cannon speak about the abundant supply of the adrenal.

Dr. Cannon said that Dr. Pike's description of the discharge from the adrenal gland, the evidence at least in the experiments that he and Stewart did together, that there was a storage in the adrenal gland when the blood supply was cut off from the medulla, seemed to him to fit in with all the evidence he had presented in regard to the adrenal, concerning the nerve supply, causing a rise in blood pressure that was well known and developing cerebral compression, for example, and would therefore cause a discharge of impulses similar to that which had been illustrated, and a discharge which would result in an increased output of adrenalin from the medulla and a consequent rise of blood pressure—that rise with a dip, that was pointed out two years ago in an observation that was made in the Harvard Laboratory, and was also noted by Elliott, and later worked out in more detail by Vincent. That disappeared, it will be recalled, in Dr. Pike's experiments, after the adrenal glands were tied off. In those experiments, after the adrenal glands were tied off, the animals, he said, died sooner than was the case when the glands were not tied off. Now he drew the conclusion that that indicated the importance of the adrenal medulla. Dr. Cannon said he did not believe that he was really justified in drawing that conclusion because when he tied off the adrenal glands, he tied off two glands of the adrenal medulla and cortex. With reference to a higher centre for emotion than those found in the thalamic region, he said he would like to have more evidence. It seemed to him that the observations of Head and Holmes were extremely interesting observations and a study of their cases indicated that these individuals had an exaggerated affective accompaniment of all sensation, just in so far as the evidence indicated that this thalamic centre was disconnected from control by the cortex. They suggested that here was a mechanism in the thalamic region already for expression of affective states of emotional experience and that it was inhibited by the cortex, and that when the cortical inhibition was removed, this lower centre then had full freedom of expression. The experiments of Sheridan and Woodworth and also the observation of Goltz indicated likewise that this lower mechanism was quite adequate, at least for the expressions of intense emotion such as rage, or possibly fear, certainly the aspect of attack was shown by these animals quite apart from any play of the cortex, because the cortex had been wholly removed.

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Miscellany.

Hyperplasia of the Parathyroids in Human Rickets.—A. M. Pappenheimer and John Minor (*Journal of Medical Research*, June to September, 1921) conclude from their studies that there is a very definite increase in the size of the parathyroid glands in cases of human rickets, and that this increase is due to multiplication of cells, not to an increase in the size of the individual cells. They found no constant or characteristic change in the cell type in human rickets, the clear cell still remaining markedly predominant. In the cases studied there was no increase in supporting tissues in the parathyroid gland in rickets, nor any increase in the vascular supply or congestion of the bloodvessels not found equally in nonrachitic cases. The child's state of nutrition had no bearing on the size of the gland as a whole, or of the individual elements.

Determination of Basal Metabolism from Carbon Dioxide Elimination.—John T. King, Jr. (*Bulletin of Johns Hopkins Hospital*, September, 1921) carried out this investigation to determine the value of measuring carbon dioxide elimination alone as an index to the metabolic rate. By studying the original chamber calorimetric work, a comparison was possible between the oxygen consumption and carbon dioxide elimination, and also between each of these factors and the heat production, as measured directly. An analysis of twenty-seven experiments with subjects in the chamber calorimeter showed that the coefficient of correlation of carbon dioxide with calories was actually higher than that of oxygen with calories. Therefore, under ideal conditions, CO_2 appears to furnish a better index to the heat production (basal metabolism) than O_2. Out of 157 observations on all types of normal subjects (except the very young), only two showed CO_2 figures that ran distinctly ahead of corresponding O_2 figures, and in these two the deviation percentage was slight. The method and apparatus used in these studies is fully described. The method is an open one, which prevents the danger of possible respiratory infection, for which the closed methods have been criticized. Among the advantages of using carbon dioxide elimination instead of oxygen consumption as an index to basal metabolism, King lists the following: The apparatus needed to collect and weigh the carbon dioxide is simple and stable. The method is open. No corrections are necessary for temperature and barometric pressure, as must be done in using volumetric methods of oxygen consumption. The psychic effect upon the patient is favorable. The results of measurements of carbon dioxide with this method correspond closely with those published by Benedict and his associates. The method has been satisfactory in several hundred observations on all types of patients, but is not recommended with diabetics, because of the altered respiratory quotient in that disease.

Relation of Hodgkin's Disease to Sarcoma.—Theodor Mueller (*Journal of Medical Research*, June to September, 1921) describes two cases of Hodgkin's disease which showed a change in the histological structure from typical lymphogranuloma to round cell sarcoma, or vice versa. One of the cases presented all the features of a rapidly progressing malignant neoplasm, with invasion of the lungs, aortic wall, and spinal column. Mueller states that from an anatomical and histological point of view lymphogranulomatosis and round cell sarcoma of the lymph nodes are only different expressions of the same process. What causes the disease to remain localized or to follow a sarcomatous infiltrating course is obscure, but is explained by Mueller as being possibly due to constitutional differences in the individual patient, the duration of the process, and the amount and virulence of the causative agent.

Thyroidectomy and Parathyroidectomy with Relation to the Development of Immune Substances.—Enrique E. Ecker and Harry Goldblatt (*Journal of Experimental Medicine*, September, 1921) divided their experiments on rabbits into three parts: 1, thyroidectomy with partial parathyroidectomy; 2, partial parathyroidectomy alone (removing only the lower glands); and 3, complete thyroparathyroidectomy. They report the following results: After thyroidectomy with partial parathyroidectomy the maximum and average hemolytic titers of the sera of rabbits injected intravenously with sheep blood are equal to or higher than those of normal animals similarly injected; antibody production is not inhibited, and no serious disturbance is caused in the adult rabbit. With a properly performed operation the animals survive and manifest only moderate cachexia in time. After complete thyroparathyroidectomy a small proportion of the animals survive even after very severe tetany develops. Those surviving show no further signs of serious disturbance. Bovine blood injected into rabbits surviving complete thyroparathyroidectomy from one to two months previously results in the production of hemolysin of a uniformly low titer as compared with that of normal animals similarly treated.

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The Biology of the Endocrine System

By W. LANGDON BROWN, M.D., F.R.C.P. (London),
London.

When Le Verrier and Adams were able from the perturbations in the orbit of Uranus to predict the discovery of a new planet and to fix at a given moment its exact position in the heavens, it was rightly regarded as a singular triumph for Newton's theories. Such predictions are valuable confirmation of the theory which enables them to be made. When Gaskell deduced from his studies of the visceral or vegetative nervous system a theory of the origin of the vertebrates from a primitive arthropod type, he met with much opposition from the orthodox morphologists. But by this theory he was enabled to predict the discovery of so many anatomical and physiological facts that he gained new support for his views. Perhaps one of the most unexpected outcomes of his theory is the better comprehension it provides of the biology of the endocrine system, the very existence of which was hardly appreciated when the theory was first formulated.

The key to evolution lies in the continuous development of the central nervous system, for on this depends an animal's chance in the struggle for existence. Government becomes centralized. Thus, as evolution proceeds, the apparatus for defense, originally autonomous, comes under the control of the nervous system. Before a nervous system was developed at all, and even later, when although constituted it had not yet acquired the elaborate associative mechanisms present in higher vertebrates, animal responses chiefly took the form of heliotropism, chemotropism, geotropism, stereotropism and the like. It might appear that an animal so directed would act like an uncontrolled machine and soon meet with disaster. That this may readily happen is sufficiently illustrated by the behavior of a moth toward a candle. That this does not invariably happen is due to internal controls, apparently of a chemical nature. Loeb has collected examples which show how the conduct of an animal without associative mechanisms (and therefore without consciousness as ordinarily understood) is modified by chemical means. As he says, the theory of tropisms is at the same time the theory of instincts, if due consideration is given to the rôle of hormones in producing certain tropisms and suppressing others.

The internal secretions result from the specialization of the old chemiotactic mechanisms to which primitive animals reacted before there was a nervous system at all. They reveal their antiquity in the way they cling to vestigial structures. Not infrequently when in the course of evolution a structure has become useless for its original purpose the endocrine system supplies it with a new tenant. This change of function is illustrated by the thyroid, parathyroid, thymus, pituitary and pineal glands. They remind us of the hermit crab that seizes on an empty whelk shell. And just as the hermit crab existed before it found an empty house, so the endocrine functions were in existence, in a less specialized form, before they had a local habitation.

It is one of the merits of Gaskell's theory that it explains many of these points. In the worms there is a pair of nephridia in each segment, opening internally into the body cavity and externally on to the surface. In that primitive arthropod, Peripatus, these are still to be found at the base of each appendage. Going a little higher in the arthropod scale these nephridia persist as the coxal glands, but in the more specialized arthropods these have become differentiated according as the appendages to which they belong lie in the presomatic, mesosomatic or metasomatic regions. When the second to fifth pair of presomatic appendages became reduced in size and purely tactile in function, they were compressed and concentrated around the mouth, and necessarily their corresponding coxal glands became compressed also. We find them forming the green gland of the crustacea, which still retains an excretory function. When the arthropod evolved into a vertebrate the old alimentary tract, of which the infundibulum represents the mouth, became the central canal of the nervous system. The pituitary, originally a paired gland, still lies in close relationship to the infundibulum, as the condensed presomatic coxal glands lay close to the arthropod mouth. It must be remembered that in the arthropods the gills keep up a vigorous current of water from behind forward, so that waste products discharged in this situation are speedily carried away from the animal, whereas in the fish, with the current going in the reverse direc-

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tion, this would lead to contamination of the water supplied to the gills. Circumstances alter functions, and a new use was found for the pituitary.

The mesosomatic coxal glands of the arthropod ancestor gave rise to the tonsils, thyroid, parathyroids and thymus. It will be noted that two of these are now lymphatic in structure while the others are glandular. Now in both the invertebrates and the lower vertebrates part of a nephric tubule may become converted into lymphoid tissue, which shows its association with excretory functions by taking up into its leucocytes alizarin blue and carmine which have been injected. A coxal gland thus may differentiate in two directions. But it may become modified in yet a third direction. In Limulus or king crab the foremost pair of mesosomatic appendages do not bear gills but are joined ventrally to form a single plate, the operculum, which carries the genital ducts on its posterior aspect. This annexation of excretory ducts by the gonads is a familiar fact in evolution; note, for example, how throughout the vertebrates the pronephric duct becomes the oviduct and the mesonephric duct the vas deferens. It will be found that the position and arrangement of the uterus in Limulus closely resembles that of the thyroid with its thyroglossal duct in Ammocoetes, the larval lamprey, one of the most primitive of the vertebrates. Not only is the presence of this duct thus explained, but as Gaskell says, "the relationship which has been known from time immemorial to exist between the sexual organs and the thyroid in man and other animals, and has hitherto been a mystery without any explanation, may possibly be the last reminiscence of a time when the thyroid glands were the uterine glands of the palaeostracan ancestor." All recent clinical observations are in accord with the existence of this association.

The facts of comparative anatomy point to the conclusion that in the neighborhood of the gill slits, in the position which one would expect if they are homologous with coxal glands, segmentally arranged structures give rise to the tonsils, thyroid, parathyroids and thymus; the thymus arising from the dorsal side of the gill slit and the parathyroids from the ventral side. We may also have an explanation here of the close connection between tonsillar sepsis and thyroid enlargements if both structures originated from segmental coxal glands. Coincident enlargement of the thymus with that of the tonsils or of the thyroid is capable of a similar explanation. These glands have become ductless because of the modification of the appendages to which they were originally attached. This modification became necessary because the formation of a new alimentary tract, ventral to the nervous system, closed their original outlet to the surface. Coming to the metasomatic region, we find that in the Elasmobranch fishes there is an unpaired series of glands in close connection with the kidneys which Balfour called the interrenal glands. These were shown by Weldon to be derived from mesonephric tubules (later observers suggest they are pronephric), and by Swale Vincent to represent the cortical part of the adrenals. On Gaskell's theory they represent the coxal glands of the metasomatic region of the arthropod ancestor. But besides these the Elasmobranch fishes show a paired series of chromaffin glands derived from sympathetic ganglia. Going higher in the scale these separate elements coalesce, and the main mass of the chromaffin glands forms the adrenal medulla, becoming surrounded by the interrenal tissue as their cortex. Even in the mammal, however, we find accessory cortical glands, and a number of paraganglia of chromaffin tissue, which are homologous with adrenal medulla. This striking union of two structures of such widely different origin as the cortex and medulla of the adrenals clearly has an important advantage because once it was achieved in evolution it was never dropped, and I would suggest that it is typical of the way that primitive defensive mechanisms are brought under nervous control.

When Starling put forward in 1905 his theory of hormones and the chemical correlation of the body, there was for a time a tendency to underrate the influence of the nervous system. It was not realized how the endocrine glands themselves had come under nervous control, although they represented a method of stimulation of greater antiquity than the nervous system. We missed, for instance, the significance of Langley's generalization that the action of adrenaline on any part was the same as that of stimulating the sympathetic nerves to that part. Gaskell showed that the sympathetic nervous system arose from cells containing adrenaline, and that when these cells left the central nervous system, they left, not as single cells, but as two separate cells, one of which contained all the adrenaline and formed the chromaffin system, and the other the nerve cells of the sympathetic system of the vertebrate. His son, J. F. Gaskell, continuing his researches, showed that in the lamprey there was a wide distribution of adrenaline secreting cells, though the sympathetic cells are scanty. As evolution proceeded these secreting cells gradually gave way to an increasing development of the sympathetic system, so that ultimately their only surviving remnant was the medulla of the adrenal. The nervous element steadily acquires predominence over the chemical element in the partnership.

We see in the whole process, evidence, first, that endocrine functions were originally much more diffusely distributed; second, that they are then housed in structures that have lost the opportunity for their original use as evolution proceeds, and third, that the lowest of vegetative nervous system acquires a measure of control over them for the better governance of the body, for not only the adrenals but the pituitary and the thyroid have their secretion regulated through this channel.

It is beginning to become almost a truism to say that the sympathetic nervous system organizes the body for defense against an external foe, but it is equally true that it also combats the internal foe which attacks in the form of bacterial invasion. One important way in which it accomplishes both these ends is by mobilizing the blood sugar. This supplies fuel for the muscular energy needed in external defense, and for the fever which is an internal defense against bacterial toxins. We now know that the increased heat in fever is produced peripherally through the thyroid, pituitary and adrenals, particularly the first, far more than through any thermogenic centre in the brain. For bacterial toxins find the cerebral vessels remarkably impermeable to them. Now it is interesting to note how the body utilizes a product of bacterial action in the manufacture of the glandular secretion whose function it is to organize this internal defense. Kendall has shown that thyroxin, the active principle of thyroid secretion, is an iodine compound of indol, which is a decomposition product of tryptophan, a constituent of the protein molecule. The formation of an indol nucleus appears to be beyond the powers of the body; it requires it ready made. Indol is ordinarily split off by the intestinal bacteria, so that it looks as if we were dependent on these parasites, particularly Bacillus coli, for the first step in the preparation of an important hormone; one, indeed, which is essential to adult development. During the nursling period the infant gets its thyroid secretion from its mother's milk, and during that time Bacillus coli are hardly present in its bowel. The suckling child has not a very active pancreatic secretion, and therefore cannot split off tryptophan very easily from protein and thus does not form indol to any extent.

This would fit in very well with Herter's views as to a form of infantilism due to persistence of the intestinal flora of the nursling period. It would appear that the body can not only detoxicate indol by converting some of it into indican, but actually can change it to a defensive substance. This would explain McCarrison's observations on the influence of intestinal intoxication on thyroid enlargement. It is a striking example of the dynamic aspect of disease—the attack of the invader calling out a defensive response by the body; the struggle between the two always leading to the elaboration of new weapons of attack and defense, which characterizes all forms of warfare that do not end in extermination of one or other of the antagonists. It is reminiscent of the primitive excretory functions of the thyroid to find indol conjugated with iodine in its secretion, while indol conjugated with potassium sulphate continues to be excreted as indican by the kidney. It provides physiological support for the morphological derivation of both glands from segmental nephridial tubules.

It is also interesting to note that tyramine, which is produced from the putrefaction of tyrosin in the human alimentary canal, is closely similar in chemical structure and action to adrenaline. It tempts one to refer the formation of adrenaline to the tyrosin of food proteins, just as thyroxin arises from tryptophan another aromatic group in food protein. But it should be noted that the body is capable of making its own tyrosin, and that in alkaptonuria, a congenital error of metabolism, although the body is unable to utilize the tyrosin of the food, symptoms of hypoadrenalinism do not occur. Nevertheless, I anticipate that further research may show that other endocrine secretions are modifications of excretory products, just as endocrine glands are modified excretory structures. It fits in very well with this view to find that the internal secretions of the gonads are formed by interstitial cells which arise from the mesonephros or Wolffian body, itself derived from nephridial tubules.

It will be observed that so far I have omitted the pineal body from consideration. I have done so advisedly because it has an entirely different origin from those structures I have hitherto discussed. On the head of a lizard known as Hatteria there is a scale painted, as it were, to resemble an eye. Baldwin Spencer showed that this lay exactly over its pineal body, in which the vestiges of a retina could be found. Now the simplest form of eye is formed from a group of epidermal cells. Gaskell concluded that the pineal gland was all that remained of a pair of median eyes which must have been functional in the immediate ancestor of the vertebrate, seeing how perfect one of them is still in Ammocoetes, or larval lamprey. He adduced ample evidence both from its structure and its nervous connections, that this pineal eye was comparable to the right median eye of the arthropod ancestor. Thus, each has a retina of the simple upright type, connecting by means of nerve fibres with an underlying ganglion. If the pineal eye had not already lost its original function in the lower vertebrates it inevitably must have done so in the higher, where the backward growth of the cerebral hemispheres has buried it deep in the brain. That disease of the pineal body is accompanied by premature sexual development is well recognized, and Bolk suggests that its function is to retard maturity in the interests of a more prolonged somatic development, for in the higher species the individual counts for more and fertility for less. At any rate, its function would appear, like the thymus, to be chiefly confined to the infantile period.

Lewellys F. Barker considers that this action of the pineal body is not a direct secretory effect, but is due to a neural disturbance of more distant endocrine glands. This would harmonize with the view of the biology of the endocrine glands put forward here, according to which the pineal body differs entirely in origin and structure from all the others. Moreover, its close relationship to the basal ganglia of the midbrain would point to its action being exerted through the central nervous system rather than through the blood stream.

CONCLUSIONS.

Endocrine glands are modified nephridia. To this rule the only exceptions are the medulla of the adrenals, the cell islets of the pancreas and the doubtful instance of the pineal. In the worms and a lowly arthropod such as Peripatus, paired nephridia open externally in each segment. Where appendages are developed these form the coxal glands at their base. With the modification of these appendages the corresponding glands become modified. The prosomatic ones became the pituitary, the mesosomatic became the tonsils, thyroid, parathyroid and thymus, the metasomatic formed the cortex of the adrenal. Only the hindmost retained their original excretory function, becoming conglomerated into the metanephros, and instead of opening separately to the surface they drained into the metanephric duct. The pronephros and mesonephros of the primitive vertebrate kidney vanished, except in so far as the latter gives rise to the interstitial cells, and their ducts were annexed by the gonads. The close anatomical relationship between the kidneys and adrenals is thus comprehensible. The formation of the new alimentary tract and the pleural folds shut off the anterior nephridia from the surface and forced them to become ductless. Nephridia contain lymphatic structures and some of those which had thus been shut off developed this lymphatic element at the expense of the glandular, but in their phagocytic properties still show their association with excretory functions. Others acquired new secretory functions, though in some instances still showing chemically a vestige of their primitive excretory action. The endocrine functions which are the specialization of the old chemical method of stimulation and defense became concentrated in these structures which perforce had to change their functions. Gradually these chemical methods came largely under the control of the sympathetic nervous system which correlates them and enables them to be brought rapidly into action either for the ordinary processes of metabolism or for external and internal defense.

Control of Socalled Hyperthyroidism by Digitalis and Water

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The term hyperthyroidism has been applied to the cycles of cardiac dilatation, excessive tachycardia, fever, nausea and vomiting, restlessness, flushed face, with occasional delirium and an acetone odor to the breath which occur in certain cases of exophthalmic goitre, in the belief that this group of symptoms are caused by an acute overactivity of the thyroid. It would be more nearly accurate to consider these signs as the result of an acute intracellular acidosis, produced by the accumulation of acid products resulting from the excessive metabolism of exophthalmic goitre. In exophthalmic goitre every organ and tissue is overworking, especially the heart muscle. It follows that the body requires an increased amount of water in circulation to dissolve and carry away excessive acid waste products.

As long as the cardiac muscle is able to circulate enough water and oxygen to the cells of the master tissue of the great primary organs, the brain and the liver, all goes well. But as soon as the heart muscle fails to do this there results an intracellular accumulation of acids, one of the first consequences of which is vomiting. Vomiting leads to further desiccation of the cells of the master organs and hence, to a further reduction in their power to do work. As the power of the heart is progressively reduced there results a coincident progressively reduced volume of the circulating blood and the intracellular acidosis is correspondingly increased.

Under these conditions the unsatisfied acid radicles combine with the alkaline ammonia in the protein molecules, thus splitting up these living molecules; and among other consequences, heat is liberated and the nitrogen balance is lost, as is shown by blood nitrogen estimations. This is the usual mechanism of death in exophthalmic goitre.

If our reasoning is correct, then it should follow that a strengthening of the failing myocardium and the administration of large amounts of water to the cells of the master organs should produce a rapid improvement in all cases which are not actually in the early stages of dissolution. It would appear also that as the cells are thus watered and oxygenated and cleared of acids, the protein disintegration would be arrested and the abnormal body temperature and the blood nitrogen would disappear. Furthermore, it would follow from our premises that the excitability and the restlessness of the patient should not be controlled by morphine.

In the practical application of this reasoning we have adopted the following measures: The heart muscle is digitalized by the administration of not more than twenty minims of the tincture of digitalis every four hours until eight to ten doses have been given or until active nausea is produced. In the presence of acidosis vomiting the digitalis may be given in large doses by rectum. At the same time the desiccated patient is given from 4,000 to 7,000 c. c. of normal saline subcutaneously each twenty-four hours by Bartlett's method, i. e., novocaine is added to the infusion to make a one sixteenth to one thirty-second per cent. solution.

In the cases thus treated, the heart rate and the temperature and the respiration and the entire clinical picture have improved simultaneously in response to the digitalization of the heart and the intracellular watering. As a result of this experience, we have adopted these procedures as a routine in both the preoperative preparation and postoperative management of these hazardous risks. In addition to these measures the fullest anociation is employed; that is, the operation is performed in the patient's room without removing him from his bed; local anesthesia is employed, and the inhalation anesthesia does not progress beyond the stage of analgesia. In addition, the wound is left open for twenty-four hours to avoid the driving power of the aseptic wound secretions. By the employment of this plan of management the following results have been attained: *a*, The mortality rate of 1,869 thyroid operations, including 1,069 for exophthalmic goitre, has been 1.3 per cent. (twenty-five deaths). *b*, The mortality rate of 783 ligations has been 0.73 per cent. (six deaths).

SUMMARY.

The socalled postoperative hyperthyroidism is a misnomer as this condition should properly be called *acute intracellular acidosis*. The most important consideration in this case is *prevention*, as well as *treatment*, by complete anociation; by digitalizing the cardiac muscle, and by adequate watering of the tissues.

Some Observations on the Thyroid Gland

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INTRODUCTORY.

The history of the interest which now centres round the thyroid gland is exceedingly instructive. Owing to the association of enlargement of this gland with proptosis, attention was first drawn to the gland by those cases which were called after Graves, the Dublin physician, who first described the syndrome in 1835. In these cases the rôle of the thyroid was considered to be that of the villain of the piece, and the alternative title of hyperthyroidism came into being, as an expression of the disgust felt by clinicians at its behavior. In recent years, however, fresh knowledge has made it desirable to discard both this name and the equally cumbersome title exophthalmic goitre, as the position of the gland in this disorder has been recognized to be that of an organ more sinned against than sinning. In fact, the thyroid now receives credit for its attempt to stand between toxemia and the functions of the body; its reward being, in many instances, to be robbed of half its territory by the surgeon's knife. The old nomenclature still stands, and Graves's disease remains as the least objectionable title for the fully established syndrome.

Until the last two decades, the thyroid had been regarded as a more or less independent organ, which, when disgruntled, produced myxedema on the one hand, and Graves's disease on the other. Nowadays, however, opinion is almost universal in regarding this gland as having intimate relations with every other internal secretion; and it has been shown that the products of other well recognized organs can be affected by the secretion of the thyroid. It has come to be regarded, therefore, as a controlling centre for metabolism, and it is interesting to note that laboratory workers have been turning their attention to this aspect of the thyroid in ever increasing numbers.

The association of this gland with the adrenal system has been emphasized in the well known work of Sajous (1), its relation to toxemia, more especially that variety known as intestinal intoxication, has been discussed in many places. The last word, however, has not been said on this subject; far from it, as a great many gaps still remain to be bridged before we can differentiate between the varieties of poisoning, and say when it is being helpful and when it is behaving in an uncontrolled manner.

Whereas only the extreme degrees of excess and deficiency in the secretion of the gland were originally recognized, clinicians now describe signs and symptoms pathognomonic of lesser degrees of thyroid disturbance (2, 3). It has been acknowledged that degrees of overaction, more or less slight, may exist without any of the cardinal signs of Graves's disease, save one, namely tachycardia (4). Doubtless many patients show thyroid overaction of a temporary nature, which disappears leaving little, if any, trace; much as the postmortem room teaches us that tuberculosis has existed in many people although its presence has never been detected during life. There is little doubt that tachycardia is a constant indication of thyroid overaction, and it is present in mild as in more severe cases of hyperthyroidism. It would seem likely that whatever toxin is responsible for this overaction irritates the sympathetic, and, through it, the heart: and Maurice of Lyons has shown that the proptosis which is so common a feature of the fully developed syndrome owes its origin to suprarenal overaction (5, 6). This is readily understood when we realize that the protrusion of the eyeball can be brought about by engorgement of the retrobulbar venous plexus; and Sajous points out that, in the early stages, it can be made to disappear by gentle pressure on the eyeballs (7).

While the exophthalmos may or may not be present in Graves's disease it must be emphasized that a degree of prominence of the eyeballs is found in patients who certainly are not begravesed (to borrow the word suggested by Williams). In other words, this is a sign which, like the pulse rate, is open to wide variation within normal limits. The many cases of traumatic neurosis which the war produced afforded ample evidence that the thyroid is the keyboard upon which the emotions play; and while it was unusual to see proptosis accompanying the sympathetic overaction, it was by no means unknown.

If the thyroid, then, stands as a kind of halfway house between the mental and the physical, if it is, so to speak, subject to stimuli from both sources, it is not surprising that it shows variations according to the state of health of the individual. In my opinion, which is borne out by many facts, the internal economy of this gland is susceptible to constant changes; in fact, sudden enlargement of the thyroid has been recorded as the result of an emotional storm, and in Trousseau's case (8) this was accompanied by copious epistaxis, violent palpitation and protrusion of the eyes. Many helpful deductions can be made from the state of the thyroid, and perhaps the physician of the future will feel the thyroid instead of the pulse. Certain it is that in some cases he would gain as much information from the one as from the other.

THYROID ACTION AND REACTION.

At the other extreme, thyroid deficiency is encountered, with its manifold symptoms and signs. These have been carefully described by Hertoghe and other writers (9, 10, 11, 12). There is small reason to doubt that some degree of thyroid deficiency is an exceedingly common occurrence. Some writers go further and believe that after almost any infection the thyroid tends to become exhausted, and consequently to be helped by the administration of the extract. It has been stated that there are two conditions in which thyroid extract should not (with exceptions) be prescribed, namely, tuberculosis and Graves's disease (13). If these are the only two abnormal states in which this extract is contraindicated, there must indeed be a wide field of utility for its employment. And experience shows that its utility is undoubted in a range of abnormalities which exceeds the imagination even of a medical writer in the lay press; for perhaps it would be no exaggeration to say that, provided it can be administered at the right moment, the extract of this relatively small gland can delay or neutralize some of the changes which, when unchecked and allowed to upset other centres, lead to senility of mind and body. Let us glance for a while at the evidence upon which thyroid therapy has been built up. Take the case of endemic goitre. McCarrison (14) has established the factors which lead to the swelling of the thyroid which has received this name. Indisputable evidence goes to show that the disease is due to a poison, and that several different poisons are capable of producing enlargement of the gland. The geographical distribution, the fact that when the local water is avoided by some members of a goitrous family they avoid the disease, and the suggestion that calcium in excess can produce goitre, are all details of interest in this connection. Organic material, notably food contaminated with fecal matter, has been shown to tend to the production of endemic goitre; and the water of goitre wells has been said to differ from goitre free water in possessing many more microorganisms.

In brief, then, endemic goitre has been accused, arraigned and found guilty of existing as the result of a toxin. The exophthalmic variety of goitre is now on its trial for a similar etiology, and evidence is accumulating which shows that this may be so. It has already been said that some of the features of Graves's disease are due to overaction of the adrenal system, while some are believed to be due to overaction of the thyroid; although it is wise to add that, according to some observers, even the thyroid symptoms are secondary to adrenal implication.

Now, the adrenal system is singularly susceptible to disturbances of metabolism; it is hand-in-glove with the thyroid, and is a twin to the sympathetic. The chemistry of its secretion bears a close similarity to certain of the products of protein decomposition, and Addison's disease demonstrates the clinical picture of extreme hypoadrenia. But there is little resemblance between adrenal exhaustion and thyroid exuberance; in fact, can the two states have anything in common? There is a common basis to both, namely, they are both the results of toxemia, and moreover, one which has drained the resistances of the body. Beyond that we cannot dogmatize, as other of the endocrines are involved, differing in the two cases.

In at least certain instances of Graves's disease which have come under my observation, the fact just cited has been proved to be the case; in other words, the overaction of the thyroid and the sympathetic excess has been shown to exist as the result of a toxemia. In one case, the patient, a lady of middle age, had suffered from Graves's disease twenty years before, but the more marked and distressing features had gradually subsided. Nevertheless, this did not deter a diagnostician from stating (even to the patient), that she had Graves's disease a short time before she came under observation by me. At that time she was suffering from a steady decrease in weight, enlargement of the thyroid of moderate degree, periodical attacks of a febrile nature, gastrointestinal disturbances, tachycardia, restlessness, but no exophthalmos. No treatment on the usual symptomatic lines was of any use whatever; and she experienced no relief at all, until the cause was recognized as a gastrointestinal toxemia and treated as such. From the day that this line of treatment was adopted, the symptoms abated—the heart ceased from raging, the digestion steadied, and the temperature chart turned over a new leaf. In a few months this lady had become plump; no more sure sign of cure exists in either a toxemia or an exophthalmic patient.

I think that the presence of intestinal disorders is commonly admitted to be one of the constant signs of Graves's disease. Might we not suggest that it be regarded as a sign that this disease is due, at any rate in some instances, to intestinal toxemia? Lane (15) has stated that atrophy of the thyroid is one of the signs of intestinal stasis. I have elsewhere (16) suggested that perhaps the thyroid has some hand in producing this stasis, or alternatively, thyroid atrophy is the terminal stage succeeding a hypertrophy, i. e., Graves's disease, which may have escaped recognition. In this way we should regard thyroid action as in the nature of a stimulant to increased catabolism (in an effort to assist in the elimination of toxins); thyroid reaction would be seen in the return to its normal state and beyond until a shrunken fibrous mass is all that remains of a functioning gland.

It will be obvious, therefore, that if this theory is accurate, the thyroid gland can be influenced in its behavior, and consequently in its reactions to bodily changes in two ways—by recognizing its susceptibility to the metabolic processes, i. e., its function as a filter, and by the administration of its extract. It is also clear that whether we see a hypothyroidism or a hyperthyroidism, depends largely upon two factors, the nature of the exciting agent, and the stage at which we encounter the process. Take, for example, its reaction to a psychic stimulus, the shell shock patient. Here there is excessive secretion in response to the emotional demands of the soldier. Is it not conceivable that the reaction will ensue, and that for a variable period there will be a relative decrease in the secretion? Perhaps the symptoms of convalescence—the languor, hypothermia, and constipation—are an expression of thyroid reaction.

TOXEMIA.

If we believe, therefore, that the thyroid enlarges at such milestones in life as puberty and the menopause, and during such functional activities as the catamenia and pregnancy, it is but a short step to the recognition of the smaller changes which occur from a variety of causes. Reference has already been made to the frequency with which thyroid enlargement was encountered in soldiers who were or had been on active service. Here the enlargement was the result of emotional stimulation.

For sometime I have been studying the condition of the thyroid in cases of toxemia, with a view to ascertain whether palpable changes could be demonstrated. In a number of patients suffering from chronic gastrointestinal disturbances, with the usual concomitants, such as sallow skin, secondary anemia, acneiform rashes and symptoms of neurasthenic fatigue, I have noticed that the thyroid has been enlarged. In many of these patients, moreover, the presence of a supernormal temperature has indicated an acceleration of the metabolic exchange, and in the absence of demonstrable sepsis elsewhere, it is fair to assume that the origin of the mischief is localized in the intestinal tract. In many cases, a bacteriological investigation has revealed the existence of abnormal microorganisms; the presence of putrefactive products in the urine is further evidence of stasis. The exact nature of the toxins still remains to be discovered; but the presence of such signs as these in conjunction with enlargement of the thyroid is certainly suggestive of the rôle of the thyroid in relation to the defence of the body.

This aspect of the thyroid was shown by McCarrison (17) in his work on goitre in India. He found that cases of endemic goitre improved greatly when treated with a vaccine made from organisms isolated from the bowel; that improvement also followed, with diminution in the size of the goitre, when a vaccine made from a colon bacillus culture was utilized; and, a similar result followed a staphylococcus vaccine. This author suggested that the improvement was due to the fact that the thyroid is the means of combating the toxins present in the bowel, and that when extra strain is put upon the gland by the addition of the toxins of intestinal amebæ, thyroid hypertrophy follows.

If this is the pathology of simple goitre, is it not reasonable to suppose that exophthalmic goitre may be due to an intestinal infection, which causes overaction of the adrenals as well as the thyroid, causing the symptoms of simple goitre with the addition of sympathetic irritation? The toxin, or toxins, may arise as the result of the decomposition of foodstuff in the intestines, or a true bacterial toxin may be formed by the spread of infecting organisms from the cecum to the small intestine.

Not only does the thyroid act and react to the presence of a toxemia, but McCarrison (18) has shown that congenital defects may be produced experimentally in the offspring of goitrous white rats. "It has been found that approximately five per cent. of the offspring of goitrous white rats living under experimental conditions, are born with completely fibrosed thyroids, while no less than sixty-three per cent. show greater or lesser degrees of thyroidal or parathyroidal change at birth" (19). Furthermore, cretins are susceptible to the development of goitre, the same author stating that about fifty per cent. of all cretins are goitrous. The action of the thyroid gland in pregnancy is interesting and important to our present study. As is well known the demands made upon this gland by the presence of the fetus call for an increased output of its secretion. If the gland is already overworked by reason of a toxemia, an insufficient amount of secretion is available, and the toxins remain to exert their harmful action upon the fetal thyroid. I have elsewhere recorded a case of hypothyroidism where the patient was in better health during pregnancy than at any other period of her adult life (20). This improvement was accompanied by a diminution in the signs of hypothyroidism, and a similar improvement was noticed when thyroid therapy was initiated. The onset of pregnancy had acted as a stimulant to the maternal thyroid, and it is reasonable to assume that the ingestion of the extract had exerted a similar action.

It has become the practice of many clinicians to prescribe small doses of thyroid extract, as part of the routine treatment of chronic toxemia. There is much to be said for this practice. Chronic toxemia affects the skin, as is shown by the hard rough skin of submyxedema; by the acneiform rash, not unusually seen in constipation, and the malodorous epidermal secretion of chronic intestinal stasis. The administration of thyroid extract aids elimination and improves the skin, indeed, this substance has been dubbed "the physiological digitalis."

For many years unduly slow cardiac action was believed to be due to a toxic cause, and bradycardia came to be regarded as a sign of some underlying toxemia. It was then shown that thyroid deficiency was accompanied by a slow pulse; now, the original belief is known to be correct, and while there is no doubt that hypothyroidism produces a slow pulse, the cause of the deficiency in secretion is generally believed to be due to toxemia. The administration of thyroid extract, therefore, will assist the thyroid to recover its balance, and will increase elimination at the same time.

THYROID DEFICIENCY.

When the thyroid secretion is deficient, there are certain well recognized signs, many of which are only present in patients suffering from a considerable degree of deficiency. There are other indications which may be looked for, and which will help the clinician in arriving at a diagnosis. Whatever the cause is which has upset the adequate working of this gland, its diversion from the normal is shown by many clinical signs. Take, first, the gland itself, In normal health, the thyroid should be palpable, but its size should be such that it can be felt by careful examination only. It should only under ordinary conditions, be barely visible, when the patient is viewed in good light. If, then, the gland stands out, if its outline can be seen from a distance of a few feet, some degree of generalized hypertrophy may be said to be present. This condition is to be regarded as the reaction of the gland to stress, and the reaction only takes place when the intoxication is getting the upper hand. Unless the thyroid is consequently weak or has suffered many things from previous infections, it can play its part adequately without enlargement.

When, therefore, enlargement is found (we are not considering the various forms of goitre where local adenomata are present, or where changes are due to cystic degeneration have ensued) it is right to look for some cause which has laid additional work on the thyroid.

It is perhaps needless to emphasize that obvious sepsis should be remedied at once; but, we may refer to some of the abnormalities which may be found and state that whether these are the cause or the result of failure of the thyroid supply they should be attended to at once. An example of this is oral sepsis. This is to be expected in many patients who have endocrine disturbances, and the failure to maintain healthy epidermal structures in the absence of adequate thyroid secretion is a well recognized fact. One aspect of this has recently been emphasized, namely, the association of dental caries, defective calcium and endocrine disturbances. A large proportion of patients suffering from joint diseases and alimentary toxemia were shown by Mutch to have active sepsis around the teeth (21). The presence of what may be termed multiple sepsis is of frequent occurrence, and shows that the defences of the body have broken down. Many individuals have oral sepsis without symptoms of toxemia, while many patients have slight sepsis and marked toxemia, which, in some instances, entirely clears up when what appears to be a small and slight infection is removed.

It is wise to remember that in dealing with such patients the natural resistances should be increased while the infecting foci are removed. Opinion is still divided as to whether pyorrhea is a primary disease of the mouth, or a manifestation of subinfection due to toxemia elsewhere in the body. It cannot be too strongly emphasized that, if we believe the thyroid to be one of the natural defences of the body against infection, and if we agree that its extract can be absorbed and replace the natural secretion, its exhibition is indicated wherever a patient is suffering from subinfection. Mutch, in the paper already referred to, says: "Chronic infection frequently damages the thyroid gland. In the present series minor forms of subthyroidism were very common while well defined myxedema or goitres of considerable size were seen in fourteen per cent. of cases. The dry extract of the thyroid was given in all such cases with great benefit to the joints" (22). Any reader interested in the relation of the thyroid to toxemia is referred to this excellent paper.

The joints, then, should always be examined when toxemia or hypothyroidism is suspected. The skin affords many signs to the endocrinologist studying such a case. The harsh dry skin of submyxedema is associated with ridged and brittle nails, deficient hair, the eyebrow sign, while patches of pigmentation are not infrequently seen. As there is usually some underlying toxemia in the thyroid deficiency, the skin may be sallow and some degree of anemia present. A greasy exudation accompanied by an unpleasant odor is said to be characteristic of the skin in chronic intestinal stasis.

THYROID THERAPY.

The relation of the two states—hypothyroidism and intestinal stasis—is seen by the reaction of the patient to the administration of thyroid extract. There is not infrequently an improvement in the intestinal evacuations once an adequate dose has been reached, the elimination of the urinary solids is increased and the patient experiences an all round improvement in his feelings. The temptation to increase the dose of the extract beyond what our judgment tells us is the suitable maximum, must be resisted at all cost, otherwise catabolism will be excessive and the patient will feel jumpy, restless, and irritable.

Good results can, however, be achieved by combining an iodine preparation with a liquid extract of the thyroid. I have been using such a combination, and have found that it achieves the results aimed at in a satisfactorily short time without producing signs of overstimulation.

The field of utility of thyroid extract is a very wide one; alone, or in combination with other extracts, it can be utilized in a large number of disorders. It can be given in all cases of toxemia, subinfection, or diminished resistance, using it, of course, for its specific physiological effects, just as the inorganic drugs are employed for their known actions. Thyroid extract raises the temperature, increases the pulse rate, and prevents the accumulation of waste material in the tissues of the body. It can be employed for long periods in small doses, if desired, without any of the bad effects which ensue with many, if not most, inorganic prescriptions. A number of patients are kept well by periodical courses of this extract. It is conceivable that such patients are examples of congenital thyroid deficiency. I have encountered quite a number of patients who feel invigorated and refreshed, and whose functions are restored to normal by this treatment. It may be that their supply of thyroid is never quite equal to the demands of the body, and therefore they are never really fit. The etiology in such cases may be analogous to that suggested by McCarrison in endemic goitre.

Thyroid therapy can accomplish a good deal in setting its own house in order. For example, the early stages of simple goitre should be regarded as a sign of deficiency of thyroiodine and should be treated by the administration of thyroid extract, or by treatment with iodine. Some authors go further and say that endemic goitre should and can be prevented by the administration of iodine (23). Probably the best results are obtained in the treatment of the early endemic goitre, that is to say before the onset of secondary degenerative changes—by a combination of iodine or potassium iodide or both with small doses of thyroid extract. Intestinal antiseptics are also recommended, on the ground that the primary infection is in the bowel (18). Marine and Kimball state in most decided terms that the hypothyroidism which shows itself as goitre, could be prevented by the administration of iodine between the ages of eleven and seventeen; and that such treatment would prevent the formation of thyroid adenomata (23).

Jelliffe (24) has recently suggested that some cases diagnosed as tabes dorsalis may, in reality, be examples of hypothyroidism, and in a preliminary statement, he suggests the pathology of such cases. It would appear that, as the endocrine system becomes more widely understood, we shall know more about the etiology of many diseases which at present leave us wondering. Jelliffe reports two cases which were diagnosed as tabes, but which cleared up with thyroid therapy.

French (25) has reported two cases of myxedema accompanied by marked mental disturbances. In one the symptoms cleared up under thyroid therapy; the other patient died of erysipelas following operation. The mental symptoms which always accompany marked disturbances of thyroid function, vary, of course, both in severity and character, and are seen in thyroid overaction as well as in hypothyroidism. It is always worth while to administer this extract to patients exhibiting signs of hypothyroidism accompanied by mental symptoms. The view is receiving increasing support that more mental disorders owe their origin to toxemia than was formerly believed to be the case. On this belief, and in view of the efficacy which this extract possesses in neutralizing the effects of toxemia, its exhibition should be tried in more of these cases. Sohmer (26) draws attention to this function of the gland. He produces evidence to show that the thyroid secretion possesses antitoxic and bacteriolytic powers; and he emphasizes that enlargement of the gland is an accompaniment of chronic infections. He is of the opinion that there is only a small step between chronic irritation of the gland and a goitre. In a survey of a number of recruits, twenty-one per cent. of all troops showed definite enlargement of the thyroid (27).

The tests which have now been devised, are of value in proving the presence of oversecretion of the thyroid, and are some guide as to the suitability of prescribing the extract in a given case. Loewi's test is perhaps the best known. It consists in the instillation of a solution of one in one thousand adrenalin into the conjunctival sac. In the subjects of hyperthyroidism this produces a dilatation of the pupil. The test is based upon the fact that in diabetes and pancreatectomized animals adrenalin has this action. Goetsch's skin test depends upon the injection of eight minims of a one in one thousand solution of adrenalin into the arm. A characteristic skin reaction, which lasts about four hours, results. The sugar tolerance test has been shown to be a most valuable guide to the presence of hyperthyroidism; while tests for nitrogen loss and acidosis are useful (28). Examination of the basal metabolic rate shows acceleration in the subjects of hyperthyroidism; while it is definitely lowered in hypothyroidism (29). Bourne has recently drawn attention to the association of menorrhagia with hyperthyroidism, and cites two pieces of evidence to show this association; first, the basal metabolic rate, secondly, the reaction of both the basal metabolic rate and menorrhagia when x ray application was made to the thyroid gland. The metabolic rate divided the patients into two groups; 1, those about the age of puberty who showed a normal or depressed rate, in spite of considerable thyroid enlargement in some of them; 2, those patients who were sexually mature. The latter group contained three who were married, in whom the menorrhagia had continued from the last confinement. The author suggests that the hyperthyroidism of pregnancy had persisted with the production of a functional menorrhagia. The sexually mature group reacted to x ray application of the thyroid, both by reduction of the basal metabolic rate to normal (in eight out of ten) and the return of normal menstruation. Three out of four of the puberty cases showed no improvement (30).

Thyroid extract has been utilized to relieve the itching of jaundice as it has been shown that administration of this substance diminishes the amount of bile salts in the urine (31). The relation of the liver and the thyroid has received attention at the hands of Williams, and this author, noting the similarity between many of the symptoms of myxedema, and those of jaundice, draws attention to the value of intramuscular injections of bile salts in Graves's disease. The clinical picture of myxedema and that of jaundice has certain features in common, particularly the yellow tint of the skin, the slow pulse, subnormal temperature and lethargy (32), and these similarities are certainly suggestive of a common etiological link between the two states. Furthermore, thyroid extract relieves the pruritus of jaundice, presumably by neutralizing the toxemia which underlies this symptom and by regulating the nutrition of the skin. It has been utilized in the treatment of many skin disorders, notably psoriasis, lupus vulgaris, and ichthyosis; while cases are on record in which alopecia has been relieved by its exhibition. The coagulability of the blood is always diminished in hypothyroidism, hence thyroid extract has been utilized in the hemorrhagic diathesis; and it has been stated that the coagulation time has been reduced from ten minutes to three or four minutes by two grain doses of the extract (33). For this reason it has been suggested that hemophilic patients should be prepared, if an operation be decided upon, by a course of thyroid.

Chronic rheumatism, both muscular and articular, depending as it does on a too slow destruction of toxic wastes, is frequently benefitted by this treatment. Further retention of waste products should be prevented, and it is clear that in such cases, thyroid therapy is only a subsidiary treatment, albeit a very useful agent. Obesity belongs to the same group of disorders, but here treatment by thyroid extract has been exploited to the detriment of its reputation. This is due to its unwise employment by the laity, in many cases in an effort to combat the effects of errors of diet, without due recognition of the causes of the condition. In spite of this, however, the employment of thyroid extract in company with other remedial measures is indicated in many cases of this nature. Thyroid extract assists in the oxidation of fats; it stimulates excretion and the breaking down and repair of the cell; and it stimulates other of the endocrine glands which govern nutrition.

In many of the disorders which accompany the growth of the body, this extract will be found useful. Nocturnal enuresis, in some degree or other, is a fairly usual accompaniment of growth, and in some cases, it continues past the age of puberty. The exhibition of thyroid extract is often followed by a more or less speedy cure. These children often show other signs of hypothyroidism, notable among these being enlarged tonsils and adenoid growths. The removal of these latter has often been recommended to cure enuresis, as their presence was regarded as a source of reflex irritation. Such a procedure is not always followed by alleviation of the vesical weakness; in fact, it is sometimes far from helpful. Williams reports a case in which adenoids were removed in an effort to cure enuresis, but the condition was made worse. It was, however, cured immediately by a half grain tablet of thyroid extract twice daily. I have recently had under my care a boy of nine who has suffered from this complaint all his life. Thyroid extract has caused complete cessation of the habit, but once or twice during the early days of administration, there was nocturnal passage of urine.

Thyroid extract has been advocated to diminish tonsillar hypertrophy. It is possible that the tonsils enlarge because they supply a hormone and not, as was formerly believed, in response to a demand for protection against infection. I think it would be rational to administer small doses of thyroid extract to all growing children who show signs of this hypertrophy. Also, it might be wise to prescribe a course of this extract to children who have been operated upon for this condition. Such a procedure might prevent recurrence and the frequent repetition of this operation.

The belief is daily gaining ground that infectious diseases are followed by disturbance of the thyroid, and that the frequency of delayed convalescence after the exanthemata, and of the failure to pick up after a childish complaint, is due to interference with some organic secretion. Sufficent stress has not been laid on the interrelation of one hormone with another, with the result that there is a tendency to regard thyroid extract, for example, as useful only where there are definite signs of thyroid deficiency. This is far from being the case; for the administration of this extract stimulates the patient's thyroid gland, and through this, other of the internal secretory organs, for example, the adrenals and pituitary.

Acting on this, therefore, the thyroid can be utilized as a "jumping off ground" from which to stimulate the endocrine system. That this happens in many patients under treatment by means of an extract of this gland is shown by the fact that the thin, anemic and poorly nourished child, puts on weight, picks up, and begins to flourish exceedingly. That this is solely due to the thyroid is unlikely; it is probably to be traced to the property of the thyroid in unlocking other of the internal secretions, whose activity is necessary to growth.

A complete list of the references will be published in the author's reprints.

The Psyche and the Vegetative Nervous System with Special Reference to Some Endocrinopathies*

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To state the fact that man is a social animal smacks of the obvious. One so often meets with the inference, however, that he is a mere chemical test tube that it seems necessary to emphasize the concept of his preeminent social function. The hypothesis which works best, that is, that which explains the most phenomena, regards him as an evolutionary product with an enormous ancestry. That ancestry began with cosmic physical and chemical forces. They still remain determinants for aftercoming reactions. When life first insinuated itself into dead matter; when crystalline laws were surpassed, because they were too rigid to allow for newer adaptations, a type of superchemistry arose, the behavior of which science has symbolized under the term *vital* and which became condensed in structure. Vital structures in their turn threatened to limit the development of life's accumulations. The inexorable fact of duration, that "piling up of the past upon the past," with its inevitable necessity for hanging on to the entire past, forced a supervitalism which finally in man was met by the masterly invention of the symbol, by which this mighty Atlas of the past might be compressed, in tablet form as it were, to be used in the social machinery. Its most intelligible form is language, although that is not its only product.

Then when we speak of the psyche we here mean that function of man which operates by means of and through symbols, and psychical mechanisms are chiefly symbolic mechanisms. Their study is the study of symbology with its enormous phyletic past which is just being unravelled. By many who are mostly dealing with classroom problems, this study is more often called psychology. The average classroom psychology, however, only commences to fringe on the actualities of life. The psychology that is of any service is that which has this enormously rich past, of which the previously emphasized evolutionary hypothesis takes cognizance. It is the psychology which is tucked away, condensed, compacted in the symbol. It is best termed the psychology of the unconscious, or as Bleuler (1) has termed it, deep psychology. Only by such a concept can we get into sympathetic touch with the past.

The unconscious contains all of the chemistry, the vitalism, and the symbolism. It has everything from the beginning. The psychology of the conscious is but a momentary flash of what the hundred million years of life have concealed in the living human being. It expresses only the numerator of the fraction which represents life. The immensely more important part of life, which is hidden, is the denominator, i. e., as the numerator one second is to the denominator, one hundred million years, so is our conscious knowledge of what is going on to that which really makes it happen.

Bergson, in his inimitable way, says: "It is with our entire past that we desire, will and act. Our past then is made manifest to us in the form of impulse, it is felt in the form of tendency, whereas only a small part of it is known as idea." It is, then, as readily may be seen, a long jump from the idea, the symbol, back to the beginning of things in man, the vegetative nervous system.

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From the evolutionary attitude the vegetative nervous system looks after the chemisms of the human body, hence its function is related to the earliest part of the past in the unconscious denominator. The phyletically oldest part of the vegetative nervous system, and that part which still maintains the loosest of structural relationships, is the endocrinous gland system. Some of these glands have manifest morphological resemblances to nervous structures, such as the pineal, the hypophysis, and parasympathetic ganglia, while others, such as the prostate, pancreas, and thymus, have no obvious neurological affiliations. A distinctly advancing series may be made out in which the resemblances increase. Such a series, from the least to its most obvious nervous similarities, would be prostate, testicles, ovary, thymus, thyroid, parathyroid, pancreas, choroid plexus, suprarenals, neuroglia, sympathetic paraganglia, pineal, and hypophysis.

It has been assumed by many physiologists that each of these structures elaborates some specific substance to which the name hormone (energy carrier) has been applied by English physiologists. Although only one of these hormones has thus far been definitely isolated, epinephrine (adrenaline), yet it seems fairly well demonstrated that substances specific in some sense at least exist within each of the structures mentioned. Kendall's thyroxin is possibly another.

It is quite probable that intracellular chemism in simple cellular organisms is largely a physical and chemical affair. The colloidal state of the protoplasm permits this. But with succeeding complexities channelings became essential; these, foreshadowed in the fibrovascular bundles of the plant, finally slowly progressed into the vascular, muscular, neuromuscular, and nervous structures of the adult vertebrate.

The chief hormones in these higher animals are now carried through the body by means of the blood current, and there occurs an amazingly complex interplay between the vascularly brought hormone supply and the individual need, in which the receptor end of the nervous arc touches the need reality, and the effector end makes the appropriate and adequate response in trophic, secretory or motor action.

Carbon dioxide is the original and phyletically the oldest of the hormones, parhormones, Gley prefers to call them. The phylogenesis of its successors has not yet been traced. Physiology is looking for a Mendelieff to trace out the hormone evolutionary products. A better knowledge of the chemical evolution of our present hormones is still lacking. I can refer you to no studies on the subject, as I have never seen it broached, but I feel certain that such must exist, but these need not detain us. Nevertheless, while dealing with carbon dioxide, let us stop a moment here and point out a relationship between it and respiration and the further function which man has developed as an accessory to his carbon dioxide hormone need, namely, aspiration, which is chiefly discussed as human speech.

The lung function, hormonely speaking, is closely related to the psychical function of social integration through symbolic language. I shall hope to raise several concepts for your consideration relative to the psyche and to the vegetative nervous system, which are, I believe, very pertinent in human pathology. For just as man cannot live simply to eat, so the man who utilizes his lungs only to breathe will surely die. He must do something more with them. They form a part of the mechanisms for his creative energy, and through the expression of ideas he really lives. In terms of the parable of the talents, if he simply wraps up his respiratory gift in a napkin and does not put it out to usury, i. e., to create and exchange ideas with his fellow man, he will be in the position of the one who "hath not and shall have taken away from him even that which he hath." I beg of you not to get ultrascientific—criticism usually being thought of as science by many—and remind me that deaf mutes can live.

When I hazard the expression of my conviction, concerning which I may devote an entire lecture, that the problem of the conquest of the chief enemy of the respiratory organs, the tubercle bacillus, is taking place through a better and better distribution of respiratory psychical energy—libido—I trust you will take it as something to think about and study in your individual cases along lines which it is the general purpose of this lecture to outline. If I were able to trace for you, step by step, the psychology of the unconscious so far as respiratory needs were concerned, I think we could see the pathology of tuberculosis, and many respiratory affections with an enlarged vision. The old truths are still true, but inadequate. I think that I shall be able to do this for certain asthmas for we know enough of these cases to be able to show some of the unconscious mechanisms which probably interfere with harmonious suprarenal activity, and thus bring on the asthmatic spasms.

Just here I border on an extremely important topic. I have approached it through a respiratory pathway, but it could have been approached by a number of different avenues. Shall we say, as I have preferred to phrase it, that the unconscious mental mechanisms induced a modification of the suprarenal glands or other hormone producing bodies, which in their turn so changed the vegetative nervous system control of the respiratory organs—unstriped musculature, as to induce an asthmatic attack, or shall it be phrased, as it most frequently is, that a disorder of the suprarenal gland alone or with other related endocrinous glands has brought about the altered action of the vegetative nervous system, and thus caused the asthmatic attacks, leaving the psychical situation out entirely.

Here it is that I wish to emphasize the importance of the title to this lecture. In the first place, there is not the slightest doubt that there are asthmatic attacks in which neither the psychical system nor the hormone systems are involved. Such attacks are due to direct involvement of the sensorimotor structures themselves, from tumors, caseous nodules, or syphilitic processes within the posterior mediastinum pressing upon the main nerve trunks. Then again there are other endocrinous neurological disturbances, asthma being only one in which the involvement is primarily of endocrinous origin.

These are due to acute inflammations or other direct somatic implication of an endocrinous gland. But, and here is the chief point in our discussion, there are also certain other affections of the vegetative nervous system which are preeminently or even solely psychogenic in their origin. Surgery or pharmacotherapy is essential for the first group and other therapies are illusory. Psychotherapy is hocus pocus for the second group and opotherapy or x ray therapy is indicated, while for the last group psychotherapy is alone rational and other therapies are usually buncombe.

To which group, or rather to what preponderance of action, a given disturbance belongs can be determined only after a most painstaking neurological analysis, with special methods devised to determine the specific vegetative nervous system anomalies, as well as a thorough acquaintance with the conscious and unconscious life of the patient. It is of no avail to speak of neurasthenia, or psychasthenia, or hysteria, or dementia præcox, or autointoxication; these are not terms which explain anything. In this connection it may be said that these expressions are too frequently the refuge of ignorance, which largely permit the practitioners to do what they find easiest to do, rather than what should be done for the patient. Above all, do not be thrown off the track by the cheap trick of the superficial dogmatist who pooh poohs that which makes man what he is, the psychical as well as the metaphysical subtleties.

In a previous lecture we discussed certain methods of investigating the vegetative nervous system which have come into use in the past five or six years, and which promise to aid us greatly in sizing up a large group of patients who have been much neglected because of the inconstancy and bizarreness of their symptoms.

Few will be in doubt concerning a diagnosis of cretinism or myxedema, of exophthalmic goitre, Addison's disease, diabetes, acromegaly, dwarfism, achondroplasia, Raynaud's disease, scleroderma, or psoriasis. Yet it must be emphasized that for every single evident and well marked vegetative disturbance (2) there are one hundred atypical, irregular, incomplete or mixed cases.

I am inclined to believe that fully fifty per cent. of the cases which now are frequently looked upon as abortive or mild cases of hypothyroidism or hyperthyroidism, ten years ago were diagnosed by the selfsame physicians as neurasthenia. I have done so myself in many instances, and with each periodical revision of my histories, following out the later histories, I find many important things which were entirely overlooked. Ten or twenty years in the future there will be a different way of grouping the accumulated facts, each new generalization, symbolized by a diagnosis, helping "more of the patients more of the time" than the preceding ones.

CASE HISTORY.

Case.—A woman, thirty-five years of age, of Scandinavian parentage. She had been married about fourteen years and had one child, a girl four years of age. Her husband had a good retail business, was moderately prosperous, a hard worker, and left her much to herself. About five years ago she had her first upset, with a mild exophthalmic goitre. This quieted down but during the whole time she was nervous, easily fatigued, and from the time she came for treatment, a period of three or four months, was a typical vagotonic neurotic. She had a slight struma, somewhat larger on the right side, which became worse following an attack of tonsillitis, to which disorder she stated she had not been subject.

She was slightly agitated, had a very fine tremor, her face was slightly flushed, and there were reddish patches on the skin. The eyes were not markedly protruding, the palpebral fissures were slightly unequal, the left somewhat larger than the right, the pupils were unequal, and her eyes glistened. As she looked down the eyelids followed slowly. There was no tachycardia. She said she had some respiratory hunger and felt oppressed at times. There was a sense of globus hystericus and examination showed the presence of some visceroptosis. She had lost fifteen or twenty pounds in weight and had attacks of looseness of the bowels without diarrhea. Her blood pressure was fairly high. She was vivacious in her manner, lively, and inclined to laugh and be happy. She said she slept poorly and dreamed little. Internists had told her she was suffering from autointoxication. Eosinophilia was five per cent., but gastrointestinal therapy had been inefficacious. Rest in bed had not been of particular service.

Attention might be directed to the fact that she had an increased suprarenal reaction, a mild hyperadrenalemia, also a mild hyperthyroidism. If statistics were being collected from the adrenal point of view, she would be the former; if from the thyroid, the latter. If one had just been reading Cannon's work on the reciprocal relation between the adrenals and the thyroid, it might be assumed that these glands were overfunctioning. From the knowledge that the patient had had tonsillitis which was followed by an exacerbation of her symptoms, one might assume the presence of an infectious thyroiditis of a mild grade. Any and all of these points of view would be perfectly valid. At all events, her tonsils should be cleared up and possibly x ray applications might help a possible infection. The patient might be given a rest cure or a surgical operation but I hazard the opinion that if one went no further the woman would not be helped very materially. She would probably move into another hospital or go to another doctor.

Let us turn, however, to her psychical condition and see what a sorry mess she is in and learn something about an essential element in the case. If you neglect this you really know nothing about her. On a previous occasion I referred to the occurrence of an acute hyperthyroid state directly following a sudden money loss and I venture this suggestion that conscious and unconscious money conflicts are often highly important emotional factors lying behind a hyperthyroidism.

This patient was married, not for love, but, as she expressed it, her family thought it was a good match and she was almost shoved into it. She went through with it, however. The marriage was so-so, but as she was excitable and her husband precipitate and always too busy to be with her much, she was mostly unsatisfied. "He did not marry her for that," he would say. She managed to get along, however, presenting only mild anxiety neurosis symptoms for which she was "bromided" for about ten years by numerous physicians, who called her hysterical. She remained sterile throughout this period, at no time taking any precautions or preventives. Much could be said about her creative wishes—unconscious—all this time. Of course there were curettages. The only really interesting thing was that for a time she menstruated every fourteen days. This I correlate, with apologies to my gynecological confrères, with the unconscious wish for a child.

She then had a little love affair with one of her physicians and that month became pregnant. She had had intercourse with her semiimpotent husband and her lover the same week, and it was when she commenced to worry as to whose child it was, whom it would look like when it grew up, what her husband would think, whether he would throw her out, and a host of other extremely disturbing doubts and inquiries, that the first attack of hyperthyroidism (and tonsillitis) came on. She was in an extremely agitated state for some time. Whether it was the thyroid that produced the agitation or the agitation that produced the hyperthyroid activity, I leave for you to decide. She was perturbed for some time during the pregnancy. Luckily all of the triangle were blue eyed and light haired and not being disturbed by any knowledge of Mendelian recessive factors, she finally came to a moderate state of adjustment. The hyperthyroidism slowly disappeared and she "carried on." For a time, during the nursing, she was better. Her husband was much more attentive and although he was still far from being potent she managed to get along presenting only some anxiety neurosis symptoms. Of late, however, the husband had been very busy and, as he had to get up very early in the morning, he had to go to bed early in the afternoon or evening. Little by little he left her more and more alone. He was exhausted from his day's work and at times would go months without intercourse, and when he did attempt it, it was finished in a second. She either masturbated or developed anxiety symptoms and phantasies.

Some years later we faced a new and severe flareup. Just what determined this flareup, I do not think the ordinary methods of inquiry would give us any genetic clue, not even the Goetsch test or her basal metabolism, so let us turn to the dream life during the period of the beginning of this recurrent attack and see what it may show. The reason for this type of inquiry I have tried to point out at various periods but let me repeat here the general thesis that is followed.

The individual as a whole is the subject of our inquiry at this particular time; we are not interested in any of its parts, save indirectly. As a whole, the human being functions in his *wish capacity;* he is constantly forming plans to carry out desires and cravings. In a specific way we may state that of these desires and cravings there are two chief modes of expression. They follow two broad roads, as it were, which run parallel toward a goal which, for lack of a better term, let us call happiness. I might change the metaphor and say that this stream of wishes could be compared to a twisted strand of rope made up of innumerable intertwined smaller strands in which two large groups of strands could be distinguished. These roads, these strands, following the German poet Schiller's example, we roughly call hunger and love. They constitute the great wish forces of life. Selfpreservation and race propagation are their ancestral and present day patterns. Do we eat to live, or do we live to eat? An answer to this question tells us that whereas life's energy flows more strongly now through one, now through the other, yet if one could put a pressure gauge upon these two forces, I believe the highest pressure would be found on the race propagation side, and the old dictum that selfpreservation is the first law of Nature would be found to be false. The phylum, the race, is more important than the individual. In the swing of Nature's pendulum which oscillates alternately but never just equally, for Nature does not relish being caught on a dead centre, the push is greater on the race propagation side. The fly wheel of the race propagation side is loaded. Creative evolution is thus made possible and the game goes on. It has come from protozoon to man, a lively contest of new models for anywhere from one hundred to a thousand million years. During all this slow ascent organic memory has been laying away useful bits of biological structure, building them finally into a fabric which we call man. These old bits of structuralized function, for this is what the organs of the body can advantageously be conceived of as being, contain much that is not available to conscious control. They function automatically, yet are not out of actual contact with the rest of the body.

The body as a whole is an organization of all of these, a synthesis made possible by the nervous system. Not at the receptor surfaces, not in the spinal cord, not in the midbrain, not in the motor or sensory cortical projection fields, but only finally in the frontal cortex is this ultimate synthesis made effective. Here intuition or instinct meets with intelligence. Control of the bodily movements to satisfy its cravings has an arbiter. This control factor, however, has been building itself up just as long as any organization was found to be an advantageous scheme of things. When there were no conflicts, intuitive action went straight to its goal and satisfaction was implicit. When obstacles arose, however, then a new scheme of things arose. We called it consciousness. It was a byproduct of faulty intuitive action. It was only needed because intuition became clouded. The unconscious, for such can be named the vast series of intuitive, instinctive syntheses, tended to be blocked by as yet ill assimilated conscious contacts. Man's intelligence and his instinctive reactions were in conflict, and his vaunted intelligence was wrong. When we say that conscience doth make cowards of us all, are we not only saying that the unconscious is wiser really than our intelligence?

Beyond Good and Evil is the title of a study by

Nietzsche. He has seen that force, neither good nor evil, is present within our unconscious. How shall we utilize that force? For good or for evil? That determines health or illness! Then our unconscious is very badly maligned. Yes, it is. It is the source of both good and evil, yet it is neither.

What then is good, or evil? Everyone has asked the question. So long as mankind dealt with conscious psychology anybody could make his own definitions, and everybody did. What is one man's meat is another's poison, and we have every possible brand of good and evil, according to climate, to race, to custom, and to fashion. From this point of view my doxy is orthodoxy and your doxy is heterodoxy. Everybody who thinks differently from me will be damned. So has mankind come up, getting freer and freer from certain dogma, and yet chaining himself tighter and tighter to other dogma.

In the unconscious, however, will be found truth in simple form. Here we can see what we are after without all the currents and countercurrents of camouflage and hypocrisy. The dream is the royal road to the unconscious. Such is Freud's well known and well tried out suggestion. We shall, therefore, look to the dream.

The first day I saw the patient I obtained a full history of her family, her father, mother, brothers and sisters. Her mother had always kept an eye on her. As to her dreams she told me she rarely dreamed. A great many people say the same but everybody dreams just as everybody breathes, secretes bile or urine but not all people *remember* their dreams. As to nightmares, she said she had had one recently. It was as follows:

She was going to a party. She had a lovely time. She was glad to see a stranger. (She awoke with palpitation.)

I did not attempt an analysis of this nightmare and shall not now, only remarking that the word "party" had a double significance. She saw a stranger and she woke up. Whether the wish was to have a party with a stranger and that gave her nightmare—for it will be recalled how a similar "party" gave her a "baby"—I shall leave for the moment and go to the next dream. For we must be interested in the specific rather than the general problem.

At the next visit she recalled with some difficulty the rambling dream she had had the night before. She dreamed as follows:

I met a man on an elevated station. It was at ——— Street, where there was a shuttle train [going backward and forward]. *He did not recognize me. Then there was a lady there whom he seemed to know. I was with someone then, and as I watched them I said to this someone, a woman, "Oh, if Mrs. P.* [the wife of the man] *should know this." I decided it was the best policy to say nothing about it.* (She had anxiety and some palpitations when she awoke.)

This dream was also only cautiously dealt with. Mrs. P., it came out, was a woman who kept a fashionable boardinghouse.

NOTES ON THE DREAM.

Q. *"Mr. P.?"* A. "Oh, he was her husband. He spoke several languages. He had kept a hotel. He ran around with many women. His hotel was foreclosed. She was a hard working woman. She had had some business with Mrs. X's [the patient's] husband. Her husband, Mr. X, was greatly worried about business. He might be foreclosed. He was thinking of moving or changing his business somewhat, had thought of supplying delicatessen to hotels."

Q. *"What comes to your mind about shuttle?"* A. "He got out at ——— Street. I was going to take the *downtown* train."

Q. *"The woman Mr. P. seemed to know?"* A. "Oh, she seemed to be someone I knew. A fast woman. She was a fly person. She laughed and giggled. She was short and stout." [Patient was tall and thin—disguise of censor—fair—patient was fair.]

Q. *"What comes to your mind?"* A. "I've lots of friends, I know lots of people. I know no friends like her. Mrs. d. V., she's a little suspicious. But I'm broadminded, I don't believe in being narrow-minded. Of course, people like that, they must live —what sort of a life? How much nicer and how much worse it must be. She is beautiful [patient was a handsome blonde]. People have different ways of living, after all. Terrible, in a way, but then they can love one another. A mistress, sometimes may be possible. Companions, they can get away from each other when they get on each other's nerves. Still a married woman is the best. It is safer."

This then leads to a long discussion as to her young womanhood and her girl friends, and the "fellows" that called. She liked life and wanted a good time, but with X, he was all for business. He never liked to be gay. He was tired all the time. She wanted to go out, play cards, dance, see the shows. But my mother, she had her heart set on my marrying a steady fellow. I respected him highly. He was always very serious. He never flirted at all. He is very kind, but is not my real mate. At first everything was terribly painful (dyspareunia). After a few months it was all right, but he never seemed to care much for "that." "Had not married me for that." Practically always unsatisfied.

I have presented the chief features in the dream, and have given some of the free associations of the dream. I think as you revise this material it will be quite clear that the patient was seriously disturbed over the temptation of being some man's mistress. She was resisting it, as the free associations tended to show—"A married woman is safer," etc. I did not disturb the patient too unduly, and I did not attempt to bring into consciousness whose mistress she wanted to be, but let her tell all about her troubles with her mother, about her husband and the hard work she had to go through on account of the baby, the difficulty with maids, with the cook, her husband's irritability, etc.

Then for a few days she had no dreams. Then a few about the child. In one dream, *her girl had peculiar white and green stools which worried her.* These were also left only partly analyzed. It is of very little service in a beginning analysis to try to show a woman that her child, especially a girl child, may be a nuisance to her, from certain aspects of her personality. Such truths can only be discussed when the patient knows more about the selfishness of her ego and its conflict with her better self, i. e., her love for her child.

Then she had a dream of *having triplets, two blondes and one with black hair and brown eyes.* This brought out a great deal about her fears about whether the child she had had was her husband's child or the lover's child. If her lover had brown eyes and black hair what would have happened? There was much material, but I waited feeling certain that I would soon find the man with the brown eyes and the black hair. I did not get anywhere for two weeks.

One of the dreams in the interim contained material which dealt with a doctor who curetted her and who had been very friendly. Her transference to him was very strong and the dream discussed whether I should be entitled to as close a place in her confidence as Dr. Z. Two or three neurologists she had consulted also appeared in the dreams.

In about six weeks after I had begun to see her she presented the specific situation. She dreamed: *There were two gray automobiles standing in* ——— *Street* [the street where she lived], *between* ——— *and* ——— [parallel streets, *i. e., parallel wishes*]. *One was all adorned with draperies, with bright colors on the body. There were red bandannas in it. "I don't like this car. Like a fortune teller's wagon." Out of each one came a Mr. L. with a woman. She was a fast woman. There was another woman and another man I knew. Both go to Mr. L.'s house. Then I say if Mrs. L. were alive what would she say?* Then in another dream the same night: *I visited Mrs. L. She was alive and the place was very upset. "It looks as if you were going to move," and she picks up some artificial hair, puts it on her head. It was black in color, and she said, "Is it not awful the way my husband abuses me?"*

I felt justified in bringing the issue up on this situation, and from the dream associations it soon developed that Mr. L. was the dark haired, brown eyed man who was trying to persuade her to be his mistress. He was a widower, a lawyer, wealthy (?). There was some doubts about his generosity, as a previous dream about *rings and jewelry* had partially revealed; he was rather stingy with his money, and, also possibly as a lawyer, he would get out of the *divorce possibility with her husband,* and leave her stranded after all.

It would be nice to exchange her situation with an automobile situation (wealth and comfort) but (red bandannas) was he only a *slick fortune teller,* after all, and where would she land in the interchange when she went to Mr. L.'s house as mistress (urged) or as wife of wealthy man (promised)?

Of course, for ordinary mortals without such temptations (for remember she had a husband who abused her) there is little need to be agitated and disturbed, but for her, as she used to go to the lawyer's office to discuss the possibilities of divorce, and he would make passionate love to her "on his very ample sofa," it does not take a wizard (fortune teller, myself) to see her dilemma.

Now, I could elaborate this complicated story into a three volume novel, and novelists deal with just such realistic (human) material, and we sit up into the small hours of the mornings reading them. Why? Because as novelists, they put it all into intelligible terms, while we, as scientists, deal with the impulses that need all these terms to render them intelligible to mankind. As a scientist, I bring before you only the bare framework of the forces which are pulling this woman. Her cravings and her fears, money, comfort, automobiles, sexual satisfaction on the one hand; a secure home, her daughter, her marriage security, meaning social support, on the other.

Why should we consider the hyperthyroid activities as a mediating mechanism? I do not know. If I did know, possibily I would know as much as God knows, and with all my pretensions to knowledge, I have not yet gone so far as to approach the Omnipotent. All we can say is that here is a definite series of wish components on the one hand, and an equally definite series of bodily reactions on the other. If Pavloff's dogs show gastric juice reactions to conditioned stimuli, and Cannon's cats show physical reactions to other types of stimuli, can we not say that the "prostitution-mistress-money-comfort" stimuli, have something to do with the hyperthyroid physical reactions? I seriously ask you to consider the possibilities, yes, the probabilities of this connection. It is a specific stage of the parental complex. My own experience not with this one patient, but with a score of others, has re-

And here we must leave it, but before I leave it I can not refrain from alluding to an important reflection. The situation, on the outside, and partly from the inside, is very widespread. Many human beings are caught in just this kind of a dilemma, yet hyperthyroid reactions do not develop in all. I can only say: So be it. I agree with you absolutely, There must be a definite chain of events which lead to a definite outcome. Is this hyperthyroidism alone conditioned by the factors which I have all too hurriedly sketched? I do not think so. There are constitutional factors which are a part of the structure. These are to be resolved as well, but in the meantime while we are busy with the biochemical and hereditary part, we are faced with the present, real situation. The patient wants, and yet does not want, to run away with the dark haired, brown eyed man; sacrifice the husband and the daughter; and get even with the mother who had always bossed her, and who had thrust this worthy husband upon her. Can she stand it? She can not! Her physical disease is her conscience, God's law, her sacrifice.

We as physicians must first straighten out her ethical conflict. Removing her thyroid does not do this, even if we admit that she has gotten her body into such a mess that she would rather die than renounce the *wish.* For this happens and only surgery may prevent the unconsciously arrived at physical suicide. What happens afterward, even if the thyroid be removed?

REFERENCES.

1. Bleuler: *Jahrbuch für Psychanalyse,* ii.

2. Jelliffe and White: *Disorders of the Nervous System,* Vegetative Levels. Lea & Febiger, Philadelphia, 1915; third edition, 1919.

The Thymus Gland

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Among the endocrine glands the thymus is something in the nature of a pariah. Not only is it neglected, despised and contemned by the superficial, but even so careful, conscientious and impartial an appraiser as Sir Edward Schaefer expresses grave doubts as to its eligibility for admission within the sacred circle. It is the purpose of this paper to rescue it from this unmerited slough of despond and to place it upon such a footing as may enable us to estimate it at its true value, if not in the esoteric endocrine hierarchy, then certainly in the prosaic work-a-day world of the practising physician. In order to do this it is necessary to begin at the beginning and clear our minds of some of the false conceptions with which apathy and inaccuracy have so far surrounded us.

We used to be taught that the thymus gland was essentially a fetal or prenatal organ which at birth immediately began to atrophy from disuse, to disappear completely in two or three years. We know better now. Today we recognize in the thymus an intrathoracic gland, variable in size, which, so far from disappearing in the course of the first two years of life, continues to grow up to, and even in some cases beyond, the age of puberty; at which point, though its essential histological structure may undergo atrophy, the noble elements are frequently so replaced by fat and connective tissue that the original bulk of the organ is in nowise decreased; moreover, the atrophy of these noble elements is never so complete as to prevent them from sufficiently proliferating as to restore the gland to its original integrity. Here, then, is a picture very different from that which our fathers have drawn for us. But this is not all. Of this gland, as of no other, it seems to be established that its dimensions vary in response to certain cosmic influences. Its size changes with change of climate, and alters with the alternation of the seasons. This curious and interesting fact has a very important bearing upon some practical clinical problems to which I shall presently refer.

Another fact in connection with this much neglected gland is that it has a close relationship with the genital organs in the male, but not in the female. In considering this peculiarity, upon which even Sir Edward Schaefer insists, we must beware lest our love of contrast should carry us too far. The thymus is not an exclusively male organ, any more than the thyroid is an exclusively female organ. Upon both sexes Nature confers both glands with a fine display of outward impartiality, but even as she reserves to the feminine thyroid, activities and potentialities which she denies to the masculine, so, seemingly, does she endow the male thymus with powers and prerogatives which she withholds from the female. Partly no doubt from its accessibility to clinical examination, we know more about the thyroid than we do about any of its fellows. From its reputed evanescence, and from its position just behind the manubrium sterni—so near and yet so far—we know less about the thymus than any other member of the hierarchy. And yet if the two had been studied simultaneously I have little doubt that the suggestion which I now venture to make would long ago have been an accepted fact. That suggestion is that the thymus is a sort of male thyroid, that it is possessed of the same miraculous power, though in a degree certainly inferior, of enlarging itself and decreasing in response to stimuli which seem to us singularly inadequate. That the thyroid has most intimate associations with the female genitals is shown by the fact that in woman it enlarges under sexual excitement, and at the menstrual period. It enlarges, it is true, in other circumstances, such as undue fatigue and toxic invasion, but even so, much more conspicuously in the female than in the male. And the astonishing feature of many of these enlargements is the rapidity with which they disappear. My physiological friends will not allow me to speak of the thyroid as an erectile organ, because there are no constrictors in the veins, but its clinical behavior is that of an organ endowed with a concertinalike capacity for enlarging and decreasing, which is striking. This capacity is not confined to the thyroid; it is possessed, at any rate in some persons, by the thymus. But before going into these matters, we must proceed *secundem artem* and explore the anatomy of this strangely neglected organ. So far as its physiology is concerned, the latest word is with Sir Edward Schaefer when he says:

"The functions of the thymus are more obscure than those of most of the endocrine organs; indeed there is room for question whether it should be included among these bodies. But the mutual relations which appear to be established between it and the generative glands in the male sex, perhaps entitle it to occupy a place among them."

And I will dismiss its histology with a quotation from the same authority, as brief as it is arresting in its significance. "Small portions of thymus tissue are frequently found embedded in the thyroid; on the other hand, an accessory thyroid is often met with in the substance of the thymus." There is no Cæsar so masculine but has some touch of the female; nor a Cleopatra so feminine but has some smatch of the male.

The regional anatomy of the thymus gland has been well described and admirably illustrated of recent years. In *Quain's Anatomy* (vol. ii, part ii, Splanchnology, Fig. 298) there is a striking diagram and in the recently issued volume on the *Thyroid and Thymus*, by Professor Andre Crotti, there are two others, plate xxvii and Fig. 91, even more impressive, to which I would direct your attention. Each of these pictures represents the gland either immediately before or immediately after birth, with the exception of the second diagram from *Quain*, in which the subject is six months old.

Now, we have already seen that this relatively enormous organ does not, as was formerly supposed, gradually fade into nothingness during the first two years of life, but that in normal persons it continues to grow until puberty, and we have good reason to believe that in the abnormal it does not even then decrease in size, but remains stationary, ever and anon indulging in one of those concertinalike excursions to which I have already referred. Translated into words, these pictures tell us that the gland overlies some of the most important structures in the body, such as the aortic arch, the common carotids, the right ventricle, the innominate vein, the phrenic nerves, the vagi and laryngeals, the middle and inferior ganglia of the sympathetic, and the trachea and its bifurcation. Another picture in Professor Crotti's book shows the thymus gland in profile and its relation to the socalled critical space; the space, that is, between the manubrium sterni and the vertebral column (seventh cervical and first dorsal) which in young infants measures but two to three centimetres.

Now, it is unnecessary for me to dot the i's and cross the t's of the drama with which these pictures are pregnant. It is not only the superior opening of the thorax which should be described as critical; the whole situation, even in the most severely normal people, would appear to be extremely perilous: indeed a contemplation of these pictures reinforced by a little imagination must cause us to wonder that anyone ever reaches the age of puberty. In the light of such graphic lessons it is surely no marvel that the infant mortality in all countries should be so high. To read the seeming riddle of our continued existence after birth we have to suppose that the capacity of the thoracic cage grows at a greater rate than the thymus gland; that though the thymus may continue to enlarge, it nevertheless fails to keep pace with the growing box in which it is encased, so that with each year of life it is found to have diminished in relation to its surroundings. From these considerations a practical point emerges, which is that mothers and nurses should be very seriously warned against allowing anything approaching hyperextension of a baby's head, and that all children should be taught to lie, if not on the face, then certainly well over on one side or the other.

Now, if those of us who are normal may be said to reach puberty by a monumental miracle, what language of bewilderment can be conjured up to describe the arrival of the abnormal. Because most abnormal children have abnormal endocrine glands, and when one of these glands is out of rhythm, the whole orchestra becomes jangled and out of tune, and each member expresses its discord by a hypertrophy. The condition which has been so frequently spoken of as status lymphaticus is an example of this interdependence of these glands. The thymus enlarges, and the other glands, notably the lymphatics and the spleen, enlarge in unison—presumably to endeavor to assist the thymus in the work which it is endeavoring against odds to perform. However that may be, it is quite certain that the leading part in the play is taken by the thymus, and that were it not for thymic enlargement there would be no status lymphaticus. The child with an enlarged thymus is typically the child whom our grandfathers called the scrofulous child, the angelic child of the elder Gross, of whom Symmers has thus recently written. "The angelic child may be described as delicately moulded but beautifully proportioned, blue eyed or brown with long lashes, finely chiselled features, transparent cheeks and rapid mutations in coloring, smooth skin and silklike hair, shapely limbs and quick graceful movements—a thing of beauty, but lacking in the full promise of life. Such children are not even reasonably assured of maturity, but are liable to be eliminated by sudden death, by tuberculosis, cerebrospinal meningitis or other infection." That is a well drawn picture, but we must remember that it is not all thymic children who are as attractive as this. Some of them are ugly, sluggish and rickety, but even in them the skin and its appendages are often fine and delicate. The first, the angelic child, is generally a girl, and she has an active thyroid; the second, the dullard, is usually a boy, with an inactive thyroid and its concomitant tonsils, adenoids and nocturnal enuresis.

A study of the diagrams referred to above shows how easy it is for a child with an enlarged thymus to be overtaken by sudden death, especially in the circumstances in which it usually occurs, namely hyperextension of the head, general anesthesia, and busy surgical fingers gyrating in the respiratory passages. But we must learn to look beyond this rare though moving spectacle, and consent to seek in an enlarged thymus the explanation of some of the phenomena with which we are familiar in our everyday work.

One of the most important lessons which I would ask you to learn from a study of this subject is that the thymus must offer a serious obstruction to the escape of effete matters from the structures situated above it. I know that the eyes, ears, nose and accessory sinuses are endowed each with a drainage scheme of their own; and I recognize that in so far as it is the organ of the mind, the brain is so little used by most people as to require very little drainage. Nevertheless we have to realize that there are certain diseases, notably idiopathic epilepsy, which are what mathematicians call functions of cerebral toxemia, which flourish during the full efflorescence of the thymus and decline with its falling leaf. The same may be said of what is in reality a lesser degree of the same thing, namely emotional instability. I could multiply instances by entering into details of the cerebral vascular troubles which occur in infancy and by referring them to this same cause of obstructed drainage, but I must not. I am concerned only to insist upon the great importance of this element in the presence of an enlarged thymus, and to point out briefly and in passing, that effete matters pounded back into the unyielding bony cranium afford an explanation of many troublous problems of practice which, escaping a diagnosis, find a temporary solution in mercury and iodide of potassium by the mouth, and in locally applied unguents, lotions and cosmetics.

I pass briefly by the obstruction to the trachea as too obvious to need insistence. It is said to be the cause of the dramatic sudden death to which I have already referred, which too often monopolizes the field of vision of those who condescend to think in terms of the thymus. It is also the cause of asthma, but by no means the sole cause. The symptoms of this disease are not due to a mere mechanical obstruction; they are due in a large measure to superadded nervous and probably vascular disturbance.

the whole complex being the result of pressure exercised on various structures by the enlarged thymus. Now, the element in true asthma which has proved such a serious stumbling block to the etiologist has always been the paradox of the apparent caprice of its dreaded appearances, coupled with the regularity with which it may in certain given circumstances be expected. If, now, we remind ourselves of the concertinalike capabilities of the thymus gland and its readiness to enlarge at certain times of the year, notably in the spring and early summer, and its sensitiveness to the influence of climate, and probably to foreign proteids, the paradox fades into simplicity. Moreover, asthma is substantially a disease of the male sex, which usually begins about puberty; the thymus is substantially a male organ which ought to decline about puberty. And what are the tried and trusted remedies for asthma? They are those which have a direct action in diminishing the size of the thymus gland, namely starvation, iodide of potassium and adrenalin. Of the action of the two first in this direction there is no manner of doubt. The action of adrenalin while no less certain, is certainly less direct; for adrenalin is a powerful though evanescent vasoconstrictor, while all the other palliatives of an asthmatic attack are vasodilators. Its action cannot therefore be vascular; it must be endocrinological. That the suprarenals have an intimate connection with the sympathetic or autonomous nervous system is well known, and our enlarged thymus certainly exercises pressure upon the inferior cervical ganglion of the sympathetic and its thoracic distributions. I therefore make so bold as to say that every true asthma, including hay fever, is the direct result of the pressure of seasonally, climatically and otherwise seemingly capriciously enlarging thymus, and if you ask me to explain cat asthma and such like real though almost farcical varieties, I would venture to refer you to the hypersensitiveness to slight stimuli brought about by inadequate drainage of the cranial cavity.

The subject of the relationship between the adrenals and the enlarged thymus gland is an interesting one which I propose to consider further by reference to a disease which has been almost as great a problem to the etiologist as asthma itself; I mean Graves's disease. In this curious and disfiguring malady, disfiguring both physically and mentally, there are two facts so salient that any intelligent understanding of the conditions demands not only that they be recognized but definitely correlated. The one is the enlargement of the thymus; the other is the overactivity of the suprarenals. The former, the enlarged thymus, which occurs in about eighty-five per cent. of the cases, is an astonishing event, for Graves's disease is to all intents a female disease and the thymus, to all intents a male organ. The latter, the overactive adrenal is a fundamental event, for without it the full clinical picture of the disease would not exist. Now, the adrenal contribution to the liquour sanguinis makes for masculinity; it produces energy and increases the combative instinct. Here, then, you have two organs, the thymus and the adrenal, both of which are predominantly male, playing leading parts in a disease which is predominantly female. What is the explanation?

I have been seeking the answer to this question for a very long time, and I now believe it to reside in the histological fact which I have already quoted from Sir Edward Schaefer, namely that "an accessory thyroid is often met with in the substance of the thymus." This, then, would seem to be the train of events. In response to a toxic stimulus, almost invariably of intestinal origin, the external thyroid hypertrophies. In those women who have an accessory thyroid embedded in the thymus, this hypertrophies too. This in its turn stimulates the thymus into recrudescence, and there is produced what is practically a new growth situated in the critical space between the manubrium sterni and the vertebral column, which presses upon the various important structures converging into that anatomical Clapham Junction. The part of the adrenals is not so clear. It may be that they are stimulated into increased action by the same toxin which provokes a hypertrophy of the thyroid, or, it may be that the pressure of the enlarged thymus upon the cervical sympathetic calls forth an increased adrenal activity; for the association between the sympathetic or autonomous nervous system and the adrenals is so close that they are grouped into one under the name of the chromaffin system. Or, again, it may be that the mere hyperactivity of the thyroid produced by its endeavors to fight the toxin evokes a concomitant hyperactivity of the adrenals, for the thyroid and suprarenals are known to act synergically. Which, if any, of these suggestions is the right one, the fact remains that in Graves's disease the suprarenals are in riotous activity, a fact which explains the exophthalmos when it is bilateral, and the alteration in character from docile to aggressive, which is such an outstanding feature of the disease. When the exophthalmos is unilateral or more pronounced upon one side than another, irritation of the sympathetic by the pressure of the thymus is a cause.

Were it not that I am very conscious of the compelling fascination which Graves's disease offers, I might be tempted to enlarge further upon the problems and paradoxes which it presents, but I have said enough for my immediate purpose, which is to bring into prominence the close relationship which exists between the symptoms of this much considered malady and the hypertrophy of this little considered gland. So I pass from the almost sublime to the nearly ridiculous; from the tragic heights of epilepsy, asthma and Graves's disease to the level lowlands of chlorosis and headache.

Chlorosis has always, superficially, seemed a matter so simple, simple in its obvious diagnosis, simple too, and certain, in its ferruginous therapeutics, that the intermediate stages of study have almost escaped attention. And yet, inasmuch as it is an endocrinological condition whose details still await definite explanation, it is, etiologically, far removed from simplicity. That one, at any rate, of the internal secretory glands is in fault is shown by the age incidence of the disease—at or immediately following puberty; by its rather rare but very certain tendency to produce thrombosis, especially in the cerebral circulation—for the nature of the endocrine tribute determines the composition of the plasma; by menstrual disturbances; by fatness rather than obesity; and finally by its very common association with hypertrophy of the thymus gland. That lily of languorous virtue, the chlorotic girl, may be transformed by iron and aloes into a mischievous maiden of vicious potential; but in effecting this immoral metamorphosis you must not imagine that your iron has entered straight into the soul of her red blood corpuscles. That it has indeed so entered there can be no manner of doubt, but it is equally doubtless that it has done so through the antechamber of a blood gland, and that the way has been prepared for its cordial reception by the purifying activities of the concomitant aloes. Moreover, though Jones's iron will do it, so also will Smith's arsenic; and for the same reason, namely, that both will stimulate the necessary endocrine gland whose defalcations have kept the thymus in being. With the endocrine equilibrium restored, the thymus retires to its back seat, and the lilies and languors of virtue give place to the roses and ruses of guile.

I have selected headache as representative of the unconsidered trifles which may suitably find a place in the picture which I am endeavoring to draw, because I read in a recent number of *The Practitioner* a very able, exhaustive and helpful article on the Interpretation of Headache by Dr. William Wilson of Manchester, in which I could find no mention of thymic enlargement. Now a very cursory glance at these diagrams will surely suffice to suggest, even to the most somnolent, that when the fair way of our critical Clapham Junction is interfered with, the conditions necessary to a full blooded headache are amply fulfilled. An enlargement of the thymus, concertinalike or chronic, by partially blocking that passage, will produce that headache even more surely than a headache band. And whether you classify that headache geographically, as frontal, temporal, occipital, vertical, retronasal or temporomaxillary; or whether you regard it causally, as neurasthenic, hepatic, nephritic, diabetic, anemic or plethoric, unless at the same time you remember to exclude the possible responsibility of the thymus gland, your therapeutics will be as futile as your nomenclature has been impressive. And, in this connection you must remember another factor which is at once more obvious and more neglected even than thymic enlargement, I mean the influence of tight high collars that are worn by the élite of both sexes in most civilized countries. If physicians would stoop to study the thymus gland and the dandies consent to doff their dog collars, there would not only be fewer headaches in the world, but fewer swelled heads. Inadequate drainage from the brain is as much a mental and moral matter, as it is a medical.

Now, if the persisting or enlarging thymus can even occasionally, be made responsible for such prodigies as an angelic child, or one who is epileptic, if it underlies the tragedies of asthma and Graves's disease, and can provoke chlorosis, headache and other inglorious conditions, it is meet that we should learn to detect it. How are we to do this? In answer to this question let me say at once that, although it is not necessary to search outside the ordinary method of inspection, palpation, percussion and auscultation, these means must be employed not only carefully, but even meticulously. The old but ever admirable injunction "Eyes first, fingers next, ears last," is in danger of being neglected in these days of laboratory pap feeding, when clinical acumen and the tactus eruditus are yielding place to the culture bed and the electric cardiograph; but some old fogies remember it. First, then, look at your victim and seek for evidences of that insufficient drainage of the head and neck upon which I have already so much insisted. Such evidences are the hair of silken texture, the fine, almost atrophic skin and brilliant complexion of slightly obstructed venous return; the cold congested ears; the brittle and readily decaying teeth; the slight glandular enlargements, internal, as the tonsils, and external, as the lymphatics. Lower down, you will often find an unduly prominent manubrium sterni and prominent veins. The importance of this will vary with the patient's age: in a child, it is significant; in an adult it may represent merely the past activities of a long since extinct volcano. When there are well marked veins in this neighborhood, their meaning, in the young, can scarcely be in doubt.

With your fingers, you may succeed in actually feeling the enlarged thymus just below the episternal notch, especially if you stand behind your patient and ensure that the chin is depressed. Percussion yields a great deal of useful information, but it must be the percussion of a very light stroke on a firmly impressed pleximeter finger. The sledge hammer stroke on a loosely placed pleximeter, which always denotes a bad performer, is here more than elsewhere futile and misleading. In order to induce a cryptic thymus to reveal its presence, it is well to remember the diagram which shows that extension of the head and neck brings the gland into apposition with the upper sternum. By directing the patient to adopt this attitude, an impairment of resonance which was scarcely noticeable in the ordinary posture, at once becomes unmistakeable. The percussion should proceed not only from below upwards, but also and especially from side to side, and, for an obvious reason, always along a rib. The impairment will generally be found to extend further to the left than to the right.

When it comes to auscultation, the attentive ear will generally detect a muffling of the heart sounds at the base, especially of the pulmonic second sound, which, I need hardly remind you, is normally louder than the aortic. It is probable that a great many of the socalled hemic murmurs heard at this point, are due to the direct pressure of the thymus upon the pulmonary artery, and that to a similarly caused pressure upon the aorta may be attributed some at any rate of the murmurs of socalled aortic obstruction. The inspiratory breath sounds to be heard over this area are unduly harsh in quality, and the expiratory are unduly prolonged. All these findings will be accentuated by causing the patient to extend the head and neck in the manner already described; but let me warn you to be careful how you prescribe this procedure in children in whom you have reason to suspect a considerable enlargement of the gland; for it is preeminently thus that sudden death is provoked.

Before discussing the question of treatment, let us tarry a moment to review the subject of causation. It is too wide a subject to admit of aught but a cursory study in the space at my disposal, but it is important that we should bear its essentials in mind. Let me begin by repeating what I stated at the outset, namely that the thymus changes in size with change of climate and alters with the alternation of the seasons. The fact, also quoted at the outset from Sir Edward Schaefer, namely that an accessory thyroid is often met with in the substance of the thymus, leads to the conclusion that influences which produce hypertrophy in the thyroid will assuredly lead to enlargement of the thymus. Now we recognize in the thyroid one of the principal defences against toxic invasion; we know that in childhood it will enlarge in response to toxemias of various kinds; and that after puberty it responds chronically in this manner to toxemias of intestinal origin. In these days when women all wear low necked blouses it is easy even for the most unobservant to satisfy himself of the prevalence of thyroid enlargement due to this cause.

Now if there is an accessory thyroid in the thymus gland, it is practically certain that when the principal gland enlarges, the accessory will become *particeps criminis*. Among the causes then of thymic persistence or hypertrophy I would place the influence of intestinal toxemia. Nor must we be too narrow in our estimate of what, in this connection, constitutes toxemia. I do not refer only to intestinal stasis, but also and perhaps more particularly to improper feeding. That all infants and children are grossly overfed, and that nearly all adults still more grossly overfeed themselves, is now fully, if rather furtively, acknowledged. But it is not acknowledged, it is scarcely even recognized, that the overfeeding in quantity is the result of underfeeding in quality; that the devitalizing of children's milk by boiling and of adults meats, fruits and vegetables by cooking, leads to an excess of consumption in bulk, and hence to the stagnation and putrefaction of the intestinal contents. Quick foods are quickly disposed of; dead foods are the devil. That particular devil has been responsible for most of our latter day glandular derangements; thyroid, adenoid, tonsillar, appendicular, and thymic. It was not until we tamely and basely bended the vassal's knee to the ubiquitous microbe and began boiling our milk and emasculating our other foods by depriving them of their vitamines, that these troubles burst upon us, and we shall never emancipate ourselves from this stupid slavery until we cultivate our vitality and resuscitate our physical self respect by conserving our vitamines.

And so we come to the question of treatment. It is a significant fact, significant more especially in relation to the question of overfeeding, that the surest way of securing the decrescence of an unduly intruding thymus is by starvation. But realizing as I do that fasting is neither an agreeable nor a popular discipline, I am not, in this connection, advocating it as a therapeutic measure. I plead only for such a degree of restraint as naturally and inevitably follows from the use of vitaminous foods. The food elements which protect us against the socalled deficiency diseases will protect us with equal energy against the glandular enlargements, of which thymic enlargement is only one: for you are no more likely to overeat on natural foods than you are likely to overdrink on pure water. What converts your economy into an Oliver Twist, is the provocative stimulant of cooked foods and fermented drinks.

Of other means of bringing about the involution of the thymus, by far the most potent is exposure to x rays. In this matter I claim no expert knowledge. I can only humbly and gratefully testify to the real benefit which I have secured for many patients, particularly sufferers from asthma and Graves's disease by handing them over to the tender and skilful mercies of a wizard wielding a tubal wand, dispensing milliamperes and prudently protected as to his own person by ponderous plumbic paraphernalia. But wizards are likely to be overenthusiastic about their wizardry, and I therefore warn you not on any account to allow such a one to work his will upon the enlarged thyroid of Graves's disease. His task is to reduce the size of the thymus, and, in so far as he succeeds, he will do good; but if you allow him to attack the thyroid, he will almost certainly do harm; for Graves's disease is no more a disease of the thyroid than diabetes is a disease of the kidney. Things in medicine are not always what they seem, and the actual seat of a malady is often more apparent than real. It is time that physicians recognized this fact with regard to Graves's disease, so that they may hasten the coming of the kingdom in which surgeons and wizards shall cease from troubling, and the thyroid be at rest.

A simple yet much neglected means of affording relief in cases of enlarged thymus is the ventral or facial decubitus. If you look at the thymic child or the adult chronic asthmatic you cannot fail to notice the drooping shoulders in the one and almost hunchback appearance of the other. In seeking above all things to avoid the extension of the head and neck, Nature swings the pendulum to the other extreme, and to furnish as much room as possible to this formidable gland she produces the ungainly stoop. The ventral decubitus is naturally adopted by most young children, and it is easy to see why. In this position the weight of the thymus is on the sternum and not on the sensitive structures in the mediastinum, so that in spite of the fact that his nostrils are often obstructed by the downy pillows in which the wisdom of nurses and mothers insist that he shall bury his head, our child sleeps peacefully. This position should therefore be encouraged—there are other very cogent reasons in its favor—not only in definitely thymic children, but in all young people. I have often succeeded by this simple means in relieving an exhausting cough which had successfully defied the bombardment of the bronchitic kettle and the biggest battalions of a brutalizing *Pharmacopœia*.

And so we come to the resources of orthodox medicine, which someone long ago quite justly described as the pouring of drugs about which we know little into bodies about which we know less. In connection with asthma, I mentioned adrenalin and iodine. These two comprise my therapeutic faith so far as the emergency treatment of enlarged thymus is concerned. Of the usefulness of suprarenal extract in all forms of thymic enlargement, there can, I think, be no doubt, and it is interesting to recall that Wastenson found that a continuance of the hypodermic injections resulted in a permanent reduction of the size of the gland. The story of the part which iodine plays in the human economy still awaits the writing. That it promotes the absorption of hyperplastic tissue, especially of hyperplastic glandular tissue, is one among the many words of wisdom which we have inherited from our fathers; that it has a very intimate connection with the endocrine organs, especially with the chief of them, the thyroid, is a revelation which has been vouchsafed to us in times still relatively recent; and that it achieves the former through the agency of the latter is a fact no longer open to dispute. There are very many preparations of iodine on the market, most of which I have tried, but the one to which I have come to depend with the greatest confidence is the collosol iodine. It is active, tasteless and efficacious, and in my hands has never produced iodism.

When I was a student, nothing was known about the physiology of the internal secretory glands. They were regarded as vestigial curiosities. The only occasion which I can recall, where this orthodox attitude was departed from, was when two Scottish metaphysicians engaged in a fierce controversy as to whether the pituitary or the pineal was the seat of the immortal soul. Since those days we have travelled far; not indeed along a primrose path of dalliance, but up an ascent whose difficulties are more than compensated for by the charm and beauty and promise of the prospect. Each in its turn, these miraculous glands are unveiling themselves to our astonished gaze, and each in turn seems more miraculous than the last. Into this fascinating fairyland wherein I have been always a humble, yet ever a delighted laborer, I cannot state, on this occasion, to have conducted you. My endeavor has been to awaken your interest in the potentialities of a gland, which even though it be not yet officially endowed with a miraculous essence, is nevertheless as full of present importance as it is of future promise. Nor can I at this stage pretend even to recapitulate these potentialities. In considering these diagrams, we find that the thymus is brought not only into anatomical prominence, but into scriptural consonance; for in contemplating these pictures it is easy to understand how, in the full possession of such an organ, though we may fail to emulate St. Paul in his unattractive exercise of dying daily, we nevertheless stand in jeopardy every hour.

The Diagnostic and Therapeutic Role of the Endocrines in Functional Diseases*

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Within recent years there has been an acute interest on the part of the medical profession in the glands of internal secretion. This interest has grown to such an extent that the public has become more or less cognizant of some of the salient points of glandular physiology.

I shall endeavor to present a certain phase of endocrine study and to indicate both its diagnostic and therapeutic value in a large group of common diseases. Until comparatively recent years, medical study and the attention of the profession in general have been concentrated largely upon the study of pathological conditions. Numerous methods have been devised for the recognition of structural changes in organs. I do not wish to minimize the importance of these methods, and we must not cease to develop methods for the early recognition of structural changes, but the domination of the pathological point of view in medicine has created a characteristic attitude in the medical profession toward disease. As a result of this attitude, stress is laid largely upon organic disease, and the poor patient who is not blessed—if I may use the term—with a rapidly growing tumor, with a spot of tuberculosis in his lungs, with an ulcer of the stomach or with one of the many other organic diseases, is usually not considered worthy of the serious attention of the average medical man. The condition is thrown into the medical waste basket of the unknown and labeled neurasthenia, psychasthenia, neuroses, or other convenient or even less charitable terms.

I shall attempt to present a consideration of the factors which the endocrine organs contribute toward these socalled functional diseases. In order that we may understand the relationship of the glands of internal secretion to the functional diseases, it is essential to develop the basis upon which our modern conception of endocrinology rests. The development of these conceptions has been a gradual one, and we can separate these basic facts into two groups—first, organotherapy, and second, the clinical and experimental facts which have established our modern conceptions of endocrinology.

Organic substances were used as remedies even as far back as 1400 B. C., when Ayurdea des Susruta, an East Indian physician used organic substances as remedies. We have also records from the *Papyrus Ebers* of the use of organic remedies among the Egyptians. The Greeks used organic remedies in the sacrifices to their Chthonian gods. It was not, however, until Paracelsus's time—about the beginning of the sixteenth century—that a somewhat rational use of these remedies was made, based upon the fact that when any organ is diseased the treatment of that disease should be carried on by administration of similar organic substances from healthy animals.

We shall leave this discussion of the use of organic substances for a moment and come to the clinical facts which have gradually developed our modern conception.

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Hippocrates and Galen already appreciated the fundamental conception of endocrinology, for they maintained that each organ in the body secreted some substance which contributed to the normal physiology of the individual, and that disease itself was the result of disturbances in its functions.

This conception was again elaborated, in 1775, by Bordeau, who maintained that every organ secreted a specific substance into the blood stream and that the secretions of the various glands were poured into the blood and lymph. Claude Bernard further elaborated this theory by proving the glycogen function of the liver.

The clinical data upon which our modern conception was gradually formed began really in 1786 when an English physician, Caleb Hillier Parry, described a number of cases of exophthalmos, nervousness and tremor. And this work was later followed by reports by Flajani, by Graves and by Basedow. In 1856, Addison described in a masterly way the clinical syndrome of weakness, asthenia, bronzing of the skin, etc., known as Addison's disease. In 1873, Sir William Gull described the condition known as myxedema; and in 1889, Pierre Marie—a pupil of the great Charcot—described acromegaly. This was followed in 1901 by Froehlich's description of the adipose genital dystrophy syndrome studied by Cushing in 1911.

As a result of these clinical investigations, certain facts were crystallized in our medical minds. These were that the endocrine glands were necessary to life and were necessary to normal function. Furthermore, it was appreciated that disturbances of various glands could be recognized, and that we could differentiate in the disturbances of each gland, two distinct types of manifestations the first type indicating overactivity—such as hyperthyroidism and exophthalmic goitre, in the thyroid, and acromegaly, in the pituitary. We also have evidences of underactivity, or hypoactivity—such as myxedema and cretinism, in the thyroid: Froehlich's syndrome, etc., in the pituitary.

Until recent years this was the conception of endocrinology, and it was considered only important to recognize and to treat (if possible) these conditions. The recognition was easy: the treatment was much more difficult. This conception was soon modified by the appreciation—through the work of Hertoghe, Cushing and others, on what are known as *forme fruste* types of definite endocrine syndromes. These were milder manifestations, either of a complete syndrome, or of a syndrome with only partial manifestations. These conditions would frequently pass as definite visceral diseases—but if they were definitely recognized much could be accomplished by treatment.

It was gradually appreciated, however, that our conception of socalled hypoactivity and hyperactivity did not always hold, because it was recognized that conditions of hypoactivity and hyperactivity could be present at the same time; and also that a hyperactivity could subsequently become a hypoactivity and vice versa.

But apart from this fundamental conception we must look into a field other than clinical medicine, and the work of Keith, of London, curator of the museum of the Royal College of Surgeons, as well as that of others, who maintain that the well known variations of individuals are dependent upon a variation in the endocrine physiology. They maintain that the size and the weight and the height and physiognomy, as well as the mentality and personality of the individual, are dependent upon differences in endocrine physiology. While this conception has not altogether been accepted, it is gradually gaining adherents and, at any rate, such a conception forms an excellent working hypothesis in the study of disease and helps us to understand, clinically, individual differences in reactions, the reasons why patients differ in their manifestations of the same disease, in their susceptibility, their likes and dislikes, and, in fact, even their success or failure in the world.

I shall not burden you further with the consideration of the individual elements which form our present conception, but I shall summarize briefly those fundamental conceptions as they are now appreciated. Endocrine study consists of several phases:

1. The recognition of whole definite endocrine syndromes. Most of these easily recognized syndromes are usually finished, incurable conditions which are the result either of some organic disease or some hereditary or latent lesion which develops at some time during the patient's life.

2. The definite endocrine syndromes occur as mild types—the socalled *forme fruste*. These types occur clinically in two distinct forms, a, conditions which show only a few symptoms of the well known syndrome, such as hyperthyroidism, or acromegaly, or Froehlich's syndrome; b, conditions in which the symptoms of the well defined endocrine lesions are mastered by the domination of symptoms in other viscera; for example, a gastric neurosis, or part of a hyperthyroidism, in which the hyperthyroid symptoms are not apparent unless a close study of the case is made.

3. Endocrine manifestations may also occur in the course of an infection, in which a lesion or injury of some kind to one of the ductless glands takes place: for example: in scarlet fever we very frequently have an acute adrenalitis, just as we have an acute nephritis. It is certainly quite logical that this condition should occur because the same poison—whatever it may be—which is the cause of scarlet fever and produces an acute nephritis, certainly circulates in the blood stream and must affect the adrenals as well as the kidneys, the only difference being that an acute nephritis is readily recognized while an acute adrenalitis, though it occurs quite commonly, has not been sufficiently recognized as yet. It is well known that the endocrine organs play an important rôle in immunity, and we can appreciate clinically endocrine manifestations in a patient which are really the clinical evidence of the patient's effort to overcome an infection. Thus, hyperthyroidism may occur as a clinical immune reaction to a focal infection in the teeth or the tonsils. It is quite common also to find hyperthyroidism accompanying tuberculosis, and what is still more im-

portant, it may be the initial immune reaction of a beginning tuberculosis.

4. What is important as the topic of my paper, however, is the relationship of the endocrine organs to functional diseases. From a broad viewpoint we divide diseases generally into organic and functional. In the organic diseases we group those conditions in which we can recognize some structural change in the organs or tissues of the body. The functional diseases are those in which we are unable to recognize any structural change. From a philosophical viewpoint, however, it seems to me quite impossible to have a functional change in any organ of the body without any structural change. But we call the functional diseases those in which we are unable to recognize by our present methods, any structural change, although I firmly believe that there must be some structural change even in the functional diseases. The functional diseases are characterized by changes in the normal physiology of the individual. Consequently in the study of the functional diseases, it behooves us to recognize changes in abnormal physiology as well as in normal physiology. The frequency of functional diseases is certainly evident to anyone with a moderate amount of clinical experience. I should say roughly—although I have not the figures at hand—that about eighty per cent. of the patients one sees in practice are those suffering from functional diseases, while only about twenty per cent. have an organic disease that merits the attention of the careful physician.

The study of the ductless glands in relation to functional diseases is important because it gives us an appreciation of physiological medicine as contrasted with pathological medicine. Both pathology and disturbance in physiology usually occur together, but in the functional diseases we are as yet unable to recognize structural change, and in order to be able to recognize these conditions and to treat them properly we must train ourselves to recognize abnormal physiology of organs as well as anatomical changes in them.

What evidence have we that endocrine organs play a rôle in functional diseases?

The functional diseases are characterized not by any gross change in the physiology of any of the organs but rather by variations from the normal physiology; not to the extent, however, of producing pathological changes. For example: The cerebral activities of the neurasthenic are quite like those of the normal individual, the only difference being that there is a difference in the speed of their function. The same is true of the psychasthenic, with his modifications in mental activities, his compulsions, etc. The gastric neurosis shows evidence of excessive peristalsis and excessive secretion, although there is no gross change in the gastric function.

The normal physiology, therefore, in functional diseases differs from what we might term the average in the speed of function, in the character of the function and in the vigor of function. Although there are still a great many facts yet to be learned and we are only just beginning to scratch the surface of endocrine physiology, we are able to synthesize the known facts into a definite working physiological conception. Considered generally, we may consider the ductless glands as the regulating mechanism of the functions of the body. And they therefore control practically all the somatic and mental functions. In their relation to the functions of the nervous system, we may regard them as the chemical factories of nervous activity. Specifically, we know that the thyroid regulates the rate of metabolism, or, translated into physiological terms, the speed of function. Chemically it maintains the iodine concentration of the body and controls nitrogen metabolism. It regulates, therefore, the rate of metabolism of all the organs of the nervous system and controls speed of digestion, speed of cerebral and spinal activities, and it plays an extremely important rôle in the function of the autonomic nervous system.

The parathyroids, it is well known, control the calcium metabolism, and in this way contribute to the maintenance of muscular tone and muscular irritability.

The anterior pituitary controls skeletal and muscular growth and phosphorus metabolism. The posterior pituitary controls sugar tolerance, and, possibly is an important factor in salt and water metabolism.

The adrenals functionate as two distinct organs; the adrenal medulla and the adrenal cortex. The adrenal medulla controls emergency function, such as the somatic responses in emotions and in the preparation for combat with all the specific reactions that it entails, such as the mobilization of sugar, the control of somatic and vascular blood supply and the sensitization of sympathetic nerve terminals. The adrenal cortex, however, which constitutes the larger part of the adrenal, has an important function in the growth and development of cerebral cortex. As embryological evidence of its deficiency we have the absence of adrenal cortex in anencephalic monsters. Furthermore, the adrenal cortex plays a rôle in the development of the male sexual organs and makes for masculinity.

Testes and ovaries, apart from their distinct secretory functions, play an important rôle not only in controlling the somatic sexual characteristics but in determining the masculine or feminine personality of the individual and their singular physiology.

The thymus maintains childhood and retards precocious development of puberty. The pineal, on the other hand, plays an important rôle in sexual development; and the pancreas, as is well known, has much to do with controlling sugar metabolism.

We thus see that each gland has some specific controlling mechanism in the physiology of the individual and that, as more facts are observed, we shall be able to appreciate the more intimate and more specific controlling faculties of the ductless glands.

It must be remembered, however, that each gland while having certain functions of its own has other functions which it can only carry out in conjunction with other glands; and the endocrine system, therefore, works as a unit, and that certain specific functions are controlled by several glands in several ways. For example: sugar metabolism is controlled by the pancreas, the liver, the adrenals and the pituitary. Thus the pancreas acts as a check on the liver for liberation of sugar. The adrenals, however, accelerate the liberation of glycogen, while the pituitary controls the storage of sugar, and the thyroid its utilization. Growth and development are also controlled by the pituitary and thyroid, the pituitary controlling the volume of growth and the thyroid its speed.

The ductless glands play an important rôle in the function of the nervous system. The adrenal cortex controls development of cerebral cortex, and we have evidence to prove that it modifies cerebral function. The gonads give character to psychic processes. It is quite well known that there is a singular psychology in the male and in the female. The male is inclined to have a more highly developed reasoning, mathematical and practical turn of mind; the female mind, however, depends more upon feeling and bases many of its concepts on feelings. Changes in individual make up as regards masculine and feminine produce profound changes in the inherent psychology of the individual. Consequently their reactions differ and unusual reactions develop with psychasthenic and neurasthenic manifestations. The thyroid, on the other hand, controls the speed of cerebral and psychical functions by controlling the rate of cerebral as well as other somatic metabolism. The parathyroids play an important rôle in cerebral function by controlling the calcium metabolism and the muscular irritability. There is a close relationship also between the autonomic and sympathetic systems and the endocrine organs, and since a knowledge of autonomic and sympathetic function is so important in an understanding of endocrine physiology, I shall therefore briefly point out a few of its salient features.

As you no doubt know, most of the viscera are supplied both by branches of the sympathetic and the parasympathetic, or socalled autonomic nervous system. Since the most important branch of the sympathetic system is the vagus, this is frequently called the vagotonic system. Functionally these systems are antagonistic to one another. Each controls a different visceral function. Essentially, the autonomic nerves carry the socalled driving impulses for function, while the sympathetic nerves carry impulses for checking function. This is true in the stomach, for autonomic impulses stimulate peristalsis and secretion, and sympathetic impulses inhibit peristalsis and secretion. The same is true in the intestinal tract. It is very evident in the pupil, in the interplay between the impulses from the autonomic for contracting the pupil and the impulses from the sympathetic for dilating it. In the lungs, however, the functions are reversed. In the skin, although the sweat glands are supplied by the sympathetic branches, they functionate as autonomic terminals.

It is this interplay between the autonomic and sympathetic that maintains the functional state of any particular organ. Since the clinical syndromes of autonomic stimulation and sympathetic stimulation have many of the symptoms that are found in definite endocrine manifestations, we believe that there is a close relationship between these two conditions. Whether, however, the autonomic or sympathetic stimulation is behind the endocrine manifestation or whether the endocrine manifestation is behind the other, is a moot question, but there is a good deal of evidence to prove that the endocrine manifestation is behind the autonomic or sympathetic stimulation. And so we can group various endocrines in accordance with their effect upon the autonomic or sympathetic system. Thus: Thyroid is the great vagotonic stimulant and adrenal medulla is the great sympathetic stimulant, and behind the states of vagotonia and sympathicotonia we have a thyroid manifestation in the first case and an adrenal manifestation in the other. Disturbance in balance between the state of vagotonia and sympathicotonia produces a disturbance in visceral function, and because of their relation to the endocrines, we must look to the endocrines for the causation of this trouble. We thus see the tremendous rôle of the ductless glands in controlling function, and consequently in functional diseases the disturbance lies in abnormality in the regulating mechanism for function, viz., the endocrine system. I do not mean to imply, however, that the primary trouble is always in the endocrine system. The cause may be an extraneous substance, such as an infection, or environmental difficulties and obstacles, discord between viscera and endocrines, or an actual injury or infection of one of the ductless glands, eliminating its part from the system. But, at any rate, the mechanism through which the disturbance in the control of function takes place is through the endocrine system. Nor does this imply that functional diseases must be treated by organotherapy. This is only one form of therapy, but an appreciation of the endocrine mechanism behind functional disease permits us to treat the condition more rationally even with ordinary therapeutic and hygienic means, as well as now and then with organotherapy.

I shall discuss a number of common functional diseases and indicate the endocrine factors which play a rôle in them. Of course I must by necessity confine my remarks to a few common functional diseases, as the consideration of all functional diseases would fill a large volume. In attempting to analyze specific functional diseases, it is helpful to appreciate the work of Keith and assume as a working hypothesis, whether you agree with him or not, that individual differences depend upon the domination of one endocrine gland or another. The recognition of these distinct types permits us to understand individual differences in physiology, for in the study of disturbance in function, one must first understand thoroughly the normal physiology. It would, therefore, be better to call endocrine analysis of the patient rather a study of his abnormal physiology than the study of the endocrine glands themselves. Practically, in differentiating different types of people in accordance with their dominant ductless gland, we may recognize a thyroid dominant type, a pituitary dominant type, an adrenal dominant type, a gonadal dominant type and a thymus dominant type. There are, however, numbers of mixtures, and practically the most well known mixtures are the pituitary-adrenal, the thyroid-gonadal and the thyroid-adrenal types. Each type is characterized by manifestations, anatomical, physiological and psychical, which occur in the most intense degree in the well recognized endocrine syndrome. The recognition of the types is not easy, but careful practice will enable us to differentiate the standard types.

Thus: A highly neurotic, emotional type of woman is a thyroid dominant type; the energetic, highly aggressive, hairy, dominating type, is the adrenal type; the big, broadshouldered, coarse featured, acromegalic type is the pituitary type, as is also the stout, drowsy, dull, lethargic, somewhat feminine type. Time does not permit me to go into more details of these types, nor of their combinations. I wish to point out, however, that it is essential in endocrine analysis of a case to thoroughly understand the type, as this gives us a clue as to what each individual's normal is. For you must appreciate that the term normal is quite broad. There are all sorts of normals; the street scavenger is normal, and so is the great artist. In order to appreciate the individual's reaction, we must get an idea of what his particular normal is.

The functional diseases which I shall briefly discuss are, gastric neuroses, neurasthenia, headaches, and some functional gynecological disturbances.

ENDOCRINES IN GASTRIC NEUROSES.

Functional gastric diseases are usually classified on the basis of the domination of several symptoms. Having eliminated a cancer of the stomach or an ulcer of the stomach or duodenum, and no other disease being found, the patient is usually thrust into a category depending upon the domination of one symptom, viz., gastric acidity. If the acidity is excessive it is called hyperacidity; if it is deficient it is called anacidity. Further, if no disturbance in the acidity is found, he is called a case of gastric atony, or gastroptosis, or delayed emptying, or hypermotility. It is, of course, apparent to any careful clinician that a classification of a disease upon one symptom of that kind does not explain the condition at all. In the first place, the states of atony or gastric dilatation are merely characteristics which are found in many individuals belonging to certain types and that these conditions are merely a part of the constitutional stigmata of the individual. For every case of gastric atony that suffers with stomach trouble or for every case of gastroptosis that suffers with stomach trouble, I can show two similar cases which present no symptoms whatsoever. In other words, the anatomical manifestations have no relation whatsoever to the symptoms. As regards the acidity, it frequently is a temporary condition subject to change, and does not express the underlying condition.

Clinicians have appreciated in the cases of gastroptosis the sthenic and asthenic types. Personally I feel that we should consider every case of hyperacidity, or anacidity from its general constitutional viewpoint, and in so doing we find that the patient suffers from a great many symptoms, many of which are overlooked because our vision is focussed upon the percentage of acid in the stomach.

It will readily be seen on thorough examination of these patients that they suffer from asthenia; that they are highly nervous, that they are sleepless, that they have spasmodic pain in the epigastrium; in fact, to such an extent that more frequently a diagnosis of ulcer is erroneously made. And a study of the basal metabolism of many of these cases of hyperacidity shows an increase. We therefore have a right to assume because of the asthenia, the tachycardia, the nervous irritability, the loss in weight and the increased basal metabolism that these patients show evidence of thyroid overactivity. Indeed, in some of the cases, if we look for it, we shall find definite clinical evidence of this condition.

I have had under observation patients with these symptoms in whom subsequently there developed a frank exophthalmic goitre and in some of them hyperthyroidism. Many of these patients while not showing evidence of real hyperthyroidism, do show symptoms of vagotonia and I feel that the hypersensitive condition of the autonomic nervous system is responsible for the pyloric spasm as well as for the hyperacidity. And as I tried to show earlier in my discussion, hypersensitiveness of the autonomic nervous system is usually an indication of hyperthyroidism. We can readily understand the rôle of the endocrines in the functional gastric neuroses if we bear the following facts in mind:

1. The vagus branches which supply the stomach stimulate secretion and contraction.

2. The sympathetic branches which supply the stomach lessen secretion and inhibit peristalsis.

Since we know that the thyroid is the great vagotonic stimulant and the adrenal the great sympathetic stimulant, we can readily appreciate how cases of thyroid overactivity may manifest themselves only or partly by gastric spasm and hyperacidity, while those of overactive adrenals will produce a state of sympathicotonia with excessive inhibition resulting in lessened spasm and lessened acidity.

A state of vagotonia may also be brought about by insufficient adrenal activity with scant, insufficient sympathetic stimulation, and also, a state of sympathicotonia may be brought about by insufficient thyroid activity and scant insufficient vagotonic stimulant.

The endocrine basis in the functional gastric conditions is therefore strongly suggested by the frequency with which gastric neuroses are associated with evidences of hyperthyroidism in the cases of hyperacidity and with hypothyroidism in cases of anacidity, or achylia gastrica.

The origin of gastric neuroses is frequently difficult to appreciate because the subject has not been sufficiently investigated, but on careful questioning of the patients we can appreciate how often an emotional shock or a real infection will initiate the gastric symptoms; and in order to illustrate these points I shall cite briefly the following two cases:

Case I.—A young man of about thirty-five, a jeweler, was held up in his store one day by a burglar, and shot at. Fortunately, he dodged and the bullet missed him, but the shock of the incident made him quite nervous and gave him a severe epigastric pain after eating, with asthenia, and loss in weight. This condition persisted for about six months; hyperacidity was found and the usual treatment for this condition instituted. The pain, however, gradually grew worse and one day, on account of the severity of the pain, he took several doses of aspirin for relief, which did not help him very much. When he had taken about eighty grains of aspirin, he began to have severe muscular twitchings and opisthotonus, and I was asked by his brother to see him for this apparently serious condition. This was, of course, the result of the aspirin poisoning. After we had relieved this condition, I examined the patient very carefully and discovered that beside the gastric symptoms, which were only part of the general clinical picture, he had a moderately enlarged thyroid; he had a marked exophthalmos, he perspired freely, he had diarrhea, he had a rapid pulse and was very nervous. His basal metabolism showed plus forty-five per cent. Here was a case in which as the result of the sudden shock of the hold up gastric symptoms developed which really were the initiation of hyperthyroidism which only became definitely manifest about six months later.

Now as to the explanation of this condition. It is difficult to appreciate how an emotion or a shock could produce such a profound visceral disturbance, but in view of endocrine relationships and endocrine and cerebral relationships, it can readily be understood. The sudden shock disturbed the cerebral and adrenal cortical relationship, producing adrenal insufficiency with compensating hyperthyroidism, manifesting itself at first by the gastric symptoms and later by the hyperthyroidism in addition.

Case II.—This was a man seen in consultation about a year ago last November. A month before I saw him he had recovered from a rather severe attack of scarlet fever without any renal or apparently other complications. However, about a month after he was well he began to be nervous, began to have epigastric pains after eating, had nausea and vomiting; he was profoundly weak and was unable to sleep. The examination showed the usual hyperacidity in a man of the adrenal dominant type of physiology, with a basal metabolism of plus forty-five per cent. Here was a patient who had a definite gastric neurosis with hyperacidity. The condition was evidently started by an infection. He had had scarlet fever, and the predilection of scarlet fever for the adrenals is well known. We all are able to recognize an acute nephritis in scarlet fever, and yet the adrenals and adjacent organs are supplied by the same blood. If the infection can injure the kidneys, why should it not also injure the neighboring adrenals? This it frequently does, but it is not so often recognized because our methods for recognition are not as easy as the testing of the urine for albumin. In this patient the adrenal injury produced an adrenal insufficiency with compensatory hyperthyroidism, which began with gastric symptoms.

I could go on to cite similar cases, but, briefly, I wish to point out that in the case of functional anacidity of which I can cite many cases, on examination of the patient it is found, first of all, that it occurs during severe strain, when the adrenals are functionating severely, thus stimulating the sympathetics and accelerating the checking mechanism of the stomach.

Clinically, these patients are often drowsy, they have dryness of the skin, they are nervous, they have falling out of the hair, and they show other signs of thyroid deficiency.

It is important to appreciate the type of patient in which these symptoms occur. The hyperacidity in women occurs in the thyroid dominant types. The physiology of these patients is dominated by the thyroid and they are always in a more or less mild state of vagotonia, which is, however, controlled in the ordinary physiology. But should anything happen to throw the adrenals out of function the thyroid may manifest itself by a gastric neurosis. In men, the gastric neurosis with hyperacidity is usually manifest in the adrenal types of individuals, for it is these people who utilize their adrenals more than any other gland in their physiology, and secondly, it is the gland which becomes readily exhausted or which produces sympathicotonic symptoms in the course of its intense activity.

From the point of view of therapy, however, the logical conclusion to deduce, from the facts I have just stated, would be that the treatment of these functional conditions of the stomach would be simple indeed; all you have to do is to give them organic products and—presto!—they are cured. Such results every one obtains now and then, although it is not usual. The reason for this is that our organotherapeutic substances have not been developed to such a state of efficiency. Furthermore, many of the cases are more complex than the simple ones which I have chosen as a text.

But what I wish to emphasize is—to consider these cases on the basis of the underlying abnormal physiology rather than on the basis of a single symptom. Consequently, the cases of hyperacidity should be treated as cases of hyperthyroidism. The patient should be put at rest; emotional excitement should be avoided, the usual diet should be prescribed and I have found adrenal cortex—the value of which I cannot emphasize too much—a most valuable remedy in these conditions, to overcome the underlying hyperthyroidism, for by overcoming the hyperthyroidism the vagotonic state is relieved. Atropine, benzyl benzoate and similar antivagotonic substances are extremely useful as therapeutic aids.

In the cases of anacidity and of achylia gastrica, brilliant results are obtained by recognizing the thyroid deficiency and feeding these patients small doses of thyroid extract.

The cases of gastric atony and gastroptosis, as a rule, do not suffer from symptoms unless there is a disturbance in their normal physiology and then the condition must be treated as outlined above. I have seen comparatively little result from efforts at replacing a ptosed stomach, for this condition is really only one of the constitutional stigmata that indicate the category to which the patient belongs.

THE ENDOCRINES IN NEURASTHENIA.

Neurasthenia—as the term implies—is characterized particularly by a sensation of profound weakness, by lack of concentration, by abnormal fears, by sleeplessness. It was originally thought to be due to a weakness of the nervous system, but it is readily appreciated that in neurasthenia there is nothing grossly wrong with the physiology of the nervous system. There is, however, an inability to control the functions of the nervous system in a normal manner. The neurasthenic is able to perform all his mental activities as well as his more stable neighbor, but he lacks the poise and the balance; he lacks ability to concentrate. He has a sense of profound weakness and has lost his hold of himself. As a rule this condition occurs either as the result of an infection or as the result of fatigue. And we might term this condition a fatigue syndrome with nervous symptoms. The close relationship between the adrenals, particularly the cortex, and the cerebral nervous system is already established. If there was a disturbance of the nervous system itself resulting in the production of neurasthenia which in many instances is a temporary condition, we should have more lasting symptoms and more profound derangement in function. It is being more and more appreciated, however, that the real lesion, if there is any, in neurasthenia, is in the adrenals and that the condition of neurasthenia is really a state of adrenal exhaustion. A better term, perhaps, for the condition, would be adrenal-asthenia rather than neurasthenia.

Neurasthenic patients may have many visceral symptoms as well as the instability of the nervous system. We can best explain these because of the patient's sympathetic sensitization, and because of the adrenal insufficiency. We can also explain the nervous instability because of a lack of proper accommodation between the adrenal and cerebral activity.

What evidence have we for this conception? In the first place there is a definite relationship between cerebral function and adrenal function. Anencephalic monsters have an absent adrenal cortex. The more highly developed the adrenal cortex, the more highly developed is the cerebral activity. Neurasthenia frequently follows infections, and if neurasthenia following infections was due to actual infectious processes involving any part of the cerebral cortex it would not be curable, because we all know that any injury to nervous tissue is beyond repair. On the other hand, injury to the adrenals is frequently repaired. The conditions that are found in neurasthenia, apart from the symptoms already noted, are profound asthenia, a lack of sympathetic tone, the gastric neuroses which I have just described, and low blood pressures or evanescent blood pressure changes. Consequently, it is being more and more appreciated that what we are dealing with in neurasthenia is an endocrine disturbance characterized by an adrenal insufficiency.

Many of the patients show evidence of hyperthyroidism, as indicated by the state of the basal metabolism, and by other clinical evidence of the condition.

Tom Williams, of Washington, long ago pointed out the beneficial results in neurasthenia from the use of suprarenal extracts, although this form of therapy is not at all a specific, nor as reliable as one would expect from an understanding of the endocrine basis. But there is no doubt that there is a condition of hyperthyroidism associated with neurasthenia which responds so well to rest and overfeeding. Furthermore, the sexual basis of many of the cases of neurasthenia is really behind the hyperthyroidism.

THE ENDOCRINE FACTORS IN FUNCTIONAL GYNECOLOGICAL CONDITIONS.

In gynecological conditions we have definite evidence of disturbance in endocrine physiology, because in the functional gynecological conditions the gynecologist is dealing with disturbances directly or indirectly due to disturbed function of some kind in the ovaries or in the associated glands. And in order to appreciate these disturbances, the gynecologist must first understand normal endocrine physiology—especially in its relation to the physiology of the feminine sexual organs.

Before puberty the ovaries play a secondary rôle in the female physiology except in exceptional cases. The endocrine physiology, at this time, is dominated by the other ductless glands, and, in the very early years, by the thymus as well. With the onset of puberty, the endocrine physiology of the woman is modified by a new function—that of menstruation. This is a periodical, regular modification of the woman's endocrine physiology. While the origin of menstruation is still a moot question among gynecologists, the important rôle being given to the graafian follicle, there is a good deal of evidence, however, which indicates that the entire endocrine system has much to do with this function. The reaction of the physiology of patients at the time of menstruation would certainly corroborate this. The fact that periodical and rhythmical activities are controlled by the pituitary gland (it controls hibernation, becomes enlarged during menstruation and pregnancy), it seems quite probable that the pituitary institutes this function. There is also evidence which indicates that the thyroid gland and the adrenal medulla also play an important part in this physiology. Consequently, the present data at our disposal strongly suggest that the endocrine chain which functionates during menstruation consists of posterior pituitary, thyroid, adrenal medulla and graafian follicle of the ovary, in which the pituitary probably initiates the process while the graafian follicle of the ovary controls the preparatory phenomena in the uterus, such as the hypertrophy of the endometrium, and possibly the enlargement of the breasts as well.

Since the entire endocrine system is therefore thrown into activity during menstruation, we can thus understand how each patient reacts singularly to her physiological menstruation, and we can thus appreciate why the pituitary dominant type of patient has pituitary headaches before or during menstruation, while the thyroid dominant type becomes more nervous and excitable.

During pregnancy, also, a profound modification of the endocrine physiology takes place. Two new factors enter the endocrine physiology at that time; 1, a more highly developed corpus luteum, and 2, the formation of the placenta. It is believed that the function of the more highly developed corpus luteum causes the hypertrophy of the breasts. Clinical observation seems to indicate also that the formation of the placenta checks posterior pituitary activity, because we frequently get evidence of mild deficiency symptoms of the posterior pituitary gland during pregnancy, such as drowsiness, obesity, the relief of pituitary headache, etc. With the removal of the placenta pituitary activity is increased, the uterine contractions are instituted, there is a secretion of milk, the pituitary headaches come back. In other words, the check is removed on the posterior pituitary. The obesity, too, disappears and the sugar tolerance is lowered. In pregnancy, also, the physiological reactions of the patient depend upon her dominant endocrine physiology. Some patients feel entirely well at that time; others are highly neurotic; some become melancholy, others are drowsy. It is essential, therefore, to understand the normal endocrine physiology and its physiological variations before one can appreciate the functional gynecological conditions.

I shall briefly present some endocrine features in functional gynecological conditions:

AMENORRHEA.

Amenorrhea may be produced by three distinct endocrine causes as follows: 1. Amenorrhea in pituitary cases may be simply the manifestation of the secondary gonadal deficiency resulting from the Froehlich syndrome of genital adiposity. The deficiency in the ovaries and uterus may be primary and the pituitary changes secondary. The amenorrhea may be permanent and be due to atrophic uterus and ovaries so small as to be incapable of functionating altogether. Or it may be a mild condition of pituitary deficiency which is readily helped by administration of pituitary extract. Should the genital atrophy be sufficiently marked, sterility results, which is in most instances incurable because it is due to genital atrophy. Furthermore, the pituitary deficiency may result in a masculine type of pelvis, with consequent difficulties in labor necessitating either forceps or Cæsarean operation. Or the condition may manifest itself by a one child sterility.

2. Amenorrhea may also occur in the course of a thyroid deficiency. These patients show all the signs of a *forme fruste* type of thyroid deficiency, such as drowsiness, dryness of the skin, slow pulse, etc., and respond well to thyroid feeding.

3. Amenorrhea may also occur in an adrenal dominant type of woman, in which there are more or less masculine tendencies, with more or less genital atrophy. These patients frequently compensate by development of a hyperthyroidism which will overcome the amenorrhea when the hyperthyroidism is fully developed. If it is not fully developed treatment with thyroid extract, corpus luteum, and ovarian extract is frequently distinctly beneficial.

METRORRHAGIA OF ENDOCRINE ORIGIN.

Metrorrhagia and menorrhagia of endocrine origin occur in two distinct forms, 1, in association with hyperthyroidism, and, 2, in association with pituitary manifestations. The metrorrhagia or menorrhagia occurring in association with hyperthyroidism usually occurs in the thyroid dominant types of individuals. They are then associated with evidence of hyperthyroidism. The patients are highly neurotic, extremely active sexually; they bleed profusely and they have vicarious menstruation. Physically they are usually good looking, well developed, they have well developed breasts and distinctly well developed feminine figures. The treatment of these cases should be carried out toward the relief of the hyperthyroidism by the use of adrenal cortex, emotional rest, etc., and the treatment of the associated vagotonia by the use of atropine, benzyl benzoate and other substances.

Metrorrhagia or menorrhagia occurs also in pituitary dominant types of patients. Here the condition is associated usually with severe dysmenorrhea, and the characteristic pituitary headaches, which I shall presently describe. The use of pituitary extract with ovarian extract will frequently check the metrorrhagia, it will relieve the headaches and occasionally it will lessen the dysmenorrhea, although in most instances it is necessary to relieve the dysmenorrhea by the use of atropine, benzyl benzoate or other antivagotonic remedies.

DYSMENORRHEA.

Endocrine dysmenorrhea usually occurs either as a manifestation of dyspituitarism of one kind or another, or of hyperthyroidism. The patients with dyspituitarism usually have characteristic headaches in association with the dysmenorrhea, and it occurs in types of patients who show the classical pituitary markings. Dysmenorrhea may also occur in patients showing evidence of a hyperthyroidism, even of a very slight degree. The thyroid activity usually produces such a profound uterine and ovarian stimulation as to bring about the severe painful menstruation.

THE ENDOCRINES IN STERILITY.

Sterility, when it occurs from an endocrine disturbance, is in most instances due to one of two conditions: 1, a primary or secondary defect in the development of the female genital organs, and, 2, as the result of a disturbance of endocrine physiology.

The defective development of the female genital organs usually consists of atrophy or subnormal development of the ovaries or uterus. This may be primary in the genital organs themselves, or secondary, due to pituitary deficiency. There are all sorts of degrees of such developmental disturbances. In some cases the undeveloped organs cannot functionate at all, while in others though they are anatomically subnormal, they can still functionate. There is no way in which we can determine this except possibly by a thorough study of the menstrual history of the woman and her normal physiology.

The primary ovarian developmental deficiencies are rather difficult to recognize. They are frequently associated with masculine characteristics. The secondary deficiencies, however, are usually associated with evidence of pituitary deficiency, usually in the Froehlich types of patients, associated with amenorrhea and infantile uterus.

The results of therapy in these cases cannot be predicted, and for the most part are unsuccessful. Occasionally one gets results in the Froehlich type by pituitary medication, although no change takes place in the anatomical manifestations. On the other hand, in these cases, as well as in the primary genital atrophies, leading a normal sexual life causes a gradual hypertrophy of the genital organs, so that sterility is finally overcome a number of years after marriage.

Functional endocrine sterility is usually due to thyroid deficiency, hyperthyroidism and pituitary disturbances. In these cases, where there is a thyroid deficiency there is usually a history of scanty menstruation with frequent periods of amenorrhea, associated with a generalized obesity, and other evidence of mild thyroid deficiency.

In hyperthyroidism sterility is quite frequent, because of the excessive nervous irritability, the excessive sexual activity and the frequency with which vagotonia is present in these cases, producing excessive irritability of the uterus and thus preventing the establishment of a fetus in the uterus. These patients frequently have repeated abortions. If the hyperthyroidism can be overcome they not infrequently become pregnant.

In pituitary disturbances, which are usually very easily recognized, impregnation occurs but these patients frequently abort. These cases are quite amenable to treatment.

PITUITARY HEADACHES.

One of the most definite endocrine conditions that frequently responds so readily to treatment is pituitary headaches. And it is essential to appreciate these headaches in order to obtain proper therapeutic results. Not all headaches are pituitary headaches. The characteristics of pituitary headaches are first of all their periodicity. They are induced by anything which produces pituitary enlargement, such as sexual activity, the ingestion of large quantities of carbohydrates, etc., and they are especially common before, during and occasionally after menstruation. They are usually supraorbital or bitemporal in character, and occasionally on the top of the head. They usually disappear during pregnancy. Pituitary headaches may be relieved in most instances by the administration of pituitary extract, and occasionally, though not so readily, by the use of placental extract.

CONCLUSION.

I have attempted to discuss the physiological basis of the endocrine factors in functional diseases. The problem of functional diseases is so large that it is manifestly impossible to cover the subject in a brief paper such as this. I have attempted to point out the importance of an appreciation of endocrine physiology in the study of functional diseases, for the great rule of endocrinology lies in the recognition of abnormal physiology, especially in those cases where it is impossible to recognize pathology, if indeed there is any. As far as organotherapy is concerned, organotherapy is not synonymous with endocrinology, but the appreciation of the endocrine basis of functional conditions will enable us to treat such conditions more rationally with other remedies, as well as now and then with organic substances.

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The Probable Function of the Parathyroid Glands*

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Notwithstanding the large number of investigators who have interested themselves in the subject and the larger number of the published reports, a review of which has been recently made by Boothby (1), it is still impossible to say what the function of the parathyroid glands is. This may be due to either one or both of two causes In the first place the clinical workers in the field of endocrinology have not been particularly attracted to the problem because, with the exception of the tetany arising from the surgical removal or disturbance of the parathyroids, there has not seemed to be any pathological condition which could be attributed to dysfunction of this tissue with any degree of certainty. In the second place much of the research from the biological side has been desultory and discontinuous. No single worker has been sufficiently interested to follow through his preliminary findings to an ultimate interpretation based on the use of the known methods of attack. Perhaps more is accomplished by this unsystematic work. Nevertheless the attainment of the more fundamental facts is delayed.

If we base our idea of the importance of this or that tissue of the body on the magnitude of the disturbances elicited and the rapidity with which death occurs following its removal, we must believe that the parathyroid glands are very important structures for the average animal organism in which they are found. There are many pages in the literature describing *tetania parathyreopriva* and many records of the fatal results of parathyroidectomy in many different species of animals. They afford a cumulative mass of evidence for the belief that the need of the average organism under average conditions of existence for the parathyroid function is great. On account of these sequelæ of parathyroidectomy it is of biological as well as clinical importance that the function of these glands be determined. In the following paragraphs we propose to examine briefly the present hypotheses and their possible applications.

It must be clearly understood that the interpretations made here are based on incomplete experimental evidence, and that they are tentative only, that they are subject to change if new findings make necessary, but that they indicate the path on which the more fundamental explanation is to be found.

I shall not attempt to go into any review of the literature. It is sufficient to state that the parathyroids are glands of internal secretion with a function *sui generis*, and that the results of their extirpation are solely due to the loss of the secretion they produce.

Now the most immediate symptomatic effect of parathyroidectomy is tetany. Consequently the conditions accompanying this disturbance have been most fully studied. There are at present three hypotheses which have been advanced as explanations of *tetania parathyreopriva*. There is the hypothesis of a calcium deficiency with its resultant increased neural irritability. This was proposed by MacCallum and Voegtlin (2) and is based on the finding of a decreased calcium content of the blood of parathyroidectomized animals. Other studies of Erdheim (3) indicate disturbances in calcium deposition from the abnormalities of teeth growth occurring after parathyroidectomy. There is the hypothesis of Wilson, Stearns and Janney (4) in which the tetany is attributed to an alkalosis. Other workers, however, have not been able to corroborate the observations which led to the promulgation of this interpretation. The evidence is very contradictory and unsatisfactory. Finally there is the hypothesis of Paton (5) and his coworkers that the tetany is due to the accumulation of a guanidine compound, presumably methyl-guanidine, in the organism, which the loss of the parathyroids has allowed to take place. This substance has been shown to be a toxic nerve irritant by several workers. It has also been found that there is an increase in the methyl-guanidine in blood and urine in parathyroid tetany. When this compound is injected it produces tetany similar in many respects to parathyroid tetany. Guanidine tetany may or may not be relieved by the administration of calcium salts. It thus appears to differ from true parathyroid tetany which will yield to such treatment, for a time at least. Nevertheless I am inclined towards this last hypothesis as opposed to the one in which the calcium deficiency is stressed. The alkalosis hypothesis is based on too incomplete experimental data for serious consideration at the present.

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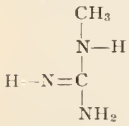
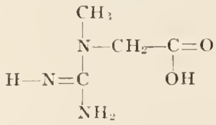
Apparently the metabolism of muscle tone differs from that of muscle movement. The experiments of Pekelharing and Van Hoogenhuyze (6) and others indicate that under normal conditions creatine is an important product of muscle tone. Creatine is relatively innocuous for the organism. It is changed to creatinine by the loss of one molecule of water and excreted in the urine. Creatine is acetylated methyl-guanidine. Creatin~~e~~ne is the anhydride of creatine. The formulas show these relationships more clearly.

Methyl-guanidine



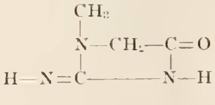
$$\begin{array}{lll} & & CH_3 \\ & & | \\ & & N-H \\ & & | \\ H- & N= & C \\ & & | \\ & & NH_2 \end{array}$$

Creatine



$$\begin{array}{lllll} & & CH_3 & & \\ & & | & & \\ & & N- & CH_2- & C=O \\ & & | & & | \\ H- & N= & C & & OH \\ & & | & & \\ & & NH_2 & & \end{array}$$

Creatinine



$$\begin{array}{lllll} & & CH_2 & & \\ & & | & & \\ & & N- & CH_2- & C=O \\ & & | & & | \\ H- & N= & C- & - & N-H \end{array}$$

Methyl-guanidine is highly toxic. It may be that this compound is a normal byproduct of muscle tone and that it is detoxicated by acetylization to creatine. If so, we might believe that the parathyroid glands produce a secretion which favors this detoxication. Hence when they are removed, methyl-guanidine accumulates from the existent condition of muscle tone. This accumulation acts as a poison upon the nerve endings in the muscle. It has been shown by Paton and his coworkers (4) that this is the point of attack of the guanidine compounds. Tetany results. This localization of the effect when combined with the experimental data already outlined as being largely confined to the musculature is strong support for the hypothesis that *the probable function of the parathyroid glands is the elaboration of a secretion which assists in the prevention of the accumulation in the organism of the toxic nerve irritant methyl-guanidine as a byproduct of that phase of muscle metabolism concerned in muscle tone.*

With the onset of tetany and the consequent changes in muscular activity, there must of necessity arise changes in the carbon dioxide production. These changes induce alterations in the respiratory exchange. When acute or continued in chronic parathyroid tetany they produce changes in the carbon dioxide capacity of the blood. The degree and type of the changes will be determined by the intensity and duration of the tetanic attacks and the compensatory adjustments made by the organism as a whole to maintain the equilibrium of the composition of the blood. Hence at one time a condition of alkalosis, at another acidosis, and at another no change may be found. Nevertheless the organism is undergoing marked disturbances of its regulating ability. As a consequence the salt content of the blood is also disturbed. One phase of this is exhibited in the decreased calcium content of the circulation. Yet, on the basis of the available data, these phenomena can only be considered as secondary happenings following the tetany. That they may and probably do intensify the tetany is not to be denied. But that they are the initial causes is yet to be proved.

Let us see how certain experimental data conform with the hypothesis expressed above.

When a group of normal laboratory stock albino rats was parathyroidectomized some seventy-nine per cent. died within forty-eight hours in *tetania parathyreopriva* (7). These animals are high strung as shown by their ready response to environmental changes with all the indications of the emotions of fear and anger. In the rats of this group the basal instincts of flight and pugnacity control the physical activities to a great degree. When such animals are picked up they are resistant, squirmy and obviously in a condition of high muscle tone. The mortality rate of another group of albino rats, descendants of the same original pair which gave rise to the members of the first group, which had been gentled for several generations was markedly different. Here but twelve per cent. died in tetany after parathyroidectomy within forty-eight hours. These animals by virtue of the constant handling and petting gave no evidence of fear or anger. Their physical activities are apparently not largely controlled by the instincts of flight and pugnacity. When picked up they are nonresistant, relaxed and obviously in a condition of low muscle tension. Finally when a group of highly excitable, caged, wild Norway rats was parathyroidectomized, ninety per cent. succumbed within the stated period (8). These rats, as is well known, are grossly pugnacious, resist all attempts at handling and are in a state of great muscular activity when disturbed. It would appear from these findings that the resistance of the rat to the loss of the parathyroid secretion is related to the stability of the nervous system. Going one step further back we can say that the dependence of the organism upon the parathyroid function is in some way related to the degree of control of the organism by its basal exciting instincts of flight and pugnacity as demonstrated by the emotions of fear and anger. For the arousing of these emotions as Cannon has well described (9), results in a stimulation of the measures of defense, among which are the effects produced by the sympathetic nervous system. Recent studies (10) indicate that the sympathetic innervation of skeletal musculature is connected with the phenomenon of muscle tone. Hence we can readily see why a heightened muscle tension accompanies a heightened excitability resulting from a dominant control by the exciting emotions of fear and anger. It follows naturally from this that the greater the excitability the greater the sympathetic stimulation, the greater the muscle tone and the greater the production of the metabolic byproducts of this phase of muscle activity, other things being equal. And if it is a function of the parathyroid glands to protect the body from the toxic action of these byproducts, those animals would be less resistant to the loss of the secretion which have as their natural habit the greater production of these substances, presumably guanidine compounds, due to their greater muscle tension arising from their greater excitability; while those animals whose trend of neural reactions is less subject to the exciting emotions of fear and anger would produce less of the toxic byproducts and would be less dependent upon parathyroid function. Such we have seen to be the case in the experiments outlined above.

The inference of practical value to be drawn from these findings and their interpretation for clinical as well as for general consideration is that a training of the individual and the patient to habits of thought in which the exciting emotions are reduced to the lowest possible level will tend to prevent the continuous overproduction of toxic compounds which in times of continued hyperexcitability might so accumulate that the body through the parathyroid function may be unable to get rid of them and tetany or even death result (11). The studies of Crile (12) indicate the value of these principles.

On account of the tetany following parathyroidectomy in animals and man there has been a tendency to attribute all tetanies coming to observation to a parathyroid origin or participation. Paralysis agitans (13), epilepsy (14), gastric tetany (15), the convulsive states (16), eclampsia (17), and idiopathic tetany (4) have had their interpretation based on disturbances of these glands. While future investigations may justify such wholesale dumping of symptoms onto a disturbance of the parathyroids the present available evidence is far from conclusive and is merely suggestive by analogy. The primary cause in most cases is to be sought elsewhere than in hypofunctioning parathyroids. In eclampsia, for instance, the probability of changes in placental permeability (18) and enzyme content (19) which result in the flooding of the maternal organism with toxic products of fetal metabolism must be taken into account. In idiopathic tetany (4) where undoubtedly we do find evidences of parathyroid insufficiency, the fundamental cause giving rise to the overproduction of guanidine bases (20) to such an extent that they cannot be handled by these glands, is to be looked for either in the inherent inability of the patient to handle metabolic products arising at certain critical periods such as weaning, during adolescence or at menstruation with their irritating influence on the nervous system and resultant increase in muscle tone, on in an instability of the nervous organization which is made manifest at these critical periods by increased excitability and tetany. Perhaps the genital glands contribute to the phenomena. These, however, are as yet speculations thrown out as indication for further inquiry. All that we can say is that it appears as if any condition which gives rise to a state of continued excitability causes an increased muscle tone, an increase in the toxic products of this phase of muscle metabolism, and may lead to tetany in individuals in whom the parathyroid function is unable to meet the needs of the organism.

The references will appear in the author's reprints.

Report of a Case of Parathyroid Insufficiency

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I have seen only one case in which symptoms appeared to be due to parathyroid insufficiency. The result of treatment with parathyroid gland was so striking that it was difficult to believe that the symptoms could have been produced in any other way. As I have not been able to find a record of any similar case, it seems worth recording again.

Case.—C. H. G., a clerk, aged forty-seven, first noticed an enlargement of his thyroid gland when he was thirty. It gradually became very large, and in 1908 the greater part of it was removed. After this he remained perfectly well until August, 1910, when he was in good health and weighed one hundred and ninety-one pounds. He then quite suddenly became extremely depressed, very nervous and restless. He had an irresistible desire to keep moving, and he slept very little, walking about the greater part of the night. He was exceedingly tremulous, so that he found it difficult to write. There was a continuous fibrillary twitching of the eyelids, but there was no tetany. His general appearance was similar to that of a severe case of Graves's disease, except that his eyes were sunken and no thyroid could be felt.

Though his appetite increased, and he ate enormously and was never sick, he lost weight rapidly, so that he weighed only one hundred and forty-four pounds when I first saw him December 2, 1910. He experienced some difficulty in swallowing, the food appearing to stick in his throat; and he also had some irregular intestinal pains. The x rays showed that the dysphagia was due to irregular spasmodic contractions of the esophagus, and perhaps a similar condition accounted for the intestinal pain. His pulse was constantly about 120, and he was greatly troubled with palpitation; his face and neck were deeply flushed. His hair had ceased to grow, but it did not become thinner. He had become completely impotent. He passed three or four large stools each day. His urine was scanty, but otherwise normal. The secretion of sweat was unaffected.

We thought that the condition was due to disturbance in the secretion of some of the ductless glands, possibly as a result of the operation, which might have injured the parathyroid glands at the same time as the greater part of the thyroid was removed. On being put to bed and given four pints of milk a day, in addition to an ordinary full diet, his pulse became slower and his abdominal discomfort disappeared. His weight continued to fall, till it reached one hundred and thirty and a half pounds on December 13th, and he found it excessively difficult to stay in bed on account of his restlessness. Dry thyroid gland aggravated the symptoms, and Moebius's antithyroid serum made him sick. He was given large doses of opium and bromide, which had the effect of making him slowly gain weight till he weighed one hundred and fifty-nine pounds on February 6, 1911; though the pulse was slower and the restlessness and tremor less marked, his other symptoms were unaltered.

He was allowed to get up in February and return to work. His weight at once began to fall, though slowly, and in spite of continuing with the same diet and taking opium and bromide, he only weighed one hundred and twenty-seven and a half pounds on June 18th. He continued his work, but on that day he was ordered one tenth of a grain of dried ox parathyroid gland four times daily, and four days later he discontinued the opium and bromide. He gained six and a half pounds in the first four days, twelve pounds in the next six days, five pounds in the next four days, and five pounds the next six days, making twenty-eight and a half pounds in nineteen days. At the same time he became stronger every day, he slept better and was less restless; the tremor and dysphagia disappeared, his hair began to grow, the quantity of urine increased, stools diminished in bulk, and pulse fell till it became slower than normal.

In a month he was almost well, but it was not until he had been taking parathyroid gland for six months that his sexual functions returned. By January 11, 1912, he weighed one hundred and sixty-one pounds, and at Christmas, 1912, he weighed one hundred and seventy-five pounds. He then discontinued taking the parathyroid preparation. Though by August, 1913, he had gained another four pounds, he was more restless and his pulse was faster than it was in 1912; he was therefore advised to continue to take one tenth of a grain of dried parathyroid gland daily, which he did until November, 1913, when he discontinued it, as his face had assumed a brick red color, his throat was somewhat full, and the vessels in his neck throbbed; these symptoms then rapidly disappeared. His weight in February, 1914, had risen to one hundred and eighty-nine pounds; he felt perfectly well and strong and no trace of nervousness remained, although he was working very hard.

In 1918, after having taken no parathyroid for nearly five years, he felt unwell for the first time since 1913. He lost nine pounds in four weeks, had slight pain in left side of abdomen, a tremor developed in his hands, and he became extremely depressed for no obvious reason. At the same time he was much troubled with palpitation, especially at night. After these symptoms had persisted for a month he again took a parathyroid tablet (one tenth of a grain) twice a day. The symptoms rapidly disappeared and he discontinued the drug at the end of six weeks, having by that time regained his weight. There has been no further return of symptoms and on February 23d he wrote me saying that he had never felt better, mentally or physically, in his life.

The Ovum as an Internal Secretory Organ

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That the ovum should be looked upon as an internal secretory organ, although of a temporary nature, deserves a certain amount of consideration. It is, of course, admitted that it possesses a more complicated and specialized function, and it is possible that the investigation of this function in correlation with the endocrinous organs may bring us nearer a solution of the influence of these organs as a whole. We know that the endocrinous organs are regulators of metabolism and that their function is correlated and balanced with much precision, as this balance is so easily upset by the least changes occurring in one or a group of these organs. For some reason the greatest amount of investigation of the function of the endocrinous organs has been carried out in the female, and we have considerable knowledge as to the changes which takes place at puberty, during menstruation and at the menopause. It would be of interest, no doubt, if further parallel researches were carried out upon the reproductive functions of the male and their influence upon the secretory organs.

With regard to the function of pregnancy, there is no doubt that the further we go upon the investigation of the gestation changes which affect the maternal organism, the more fully we realize how easily the physiological balance between the endocrinous organs can be upset by the introduction of the ovum. The ovum demands for itself immediate recognition on its arrival, it pours unknown secretions into the blood stream which bear comparison with those chemical secretions from the endocrinous organs and which markedly influence the latter. If the ovary and its correlated organs, the thyroid and the pituitary, secrete a hormone or hormones which have a marked effect in causing changes to take place in the mucosa of the uterus, mammæ and the organism as a whole, surely we must admit that the changes occurring in pregnancy are along parallel if perhaps more intensified lines. The secretion from the ovum is conveyed by its cellular tissue into the maternal blood stream and not by any ducts or through any nerve influence. This is proved by cases of tubal and ovarian pregnancies, and by pregnancies being possible where paralysis of the lower limbs is present, or where section of the cord has been performed in the lumbar region. We know that socalled toxins or chemical substances are generated by the ovum and that they are rendered innocuous by antibodies which in many cases must owe their protective energy to the healthy condition of the thyroid and other endocrinous organs. Proof of this can be found in the investigation of deranged conditions of the thyroid in pregnancy. In some forms of dysmenorrhea and more especially in those where the uterus is enlarged, softened, and the mucosa thickened and shed during menstruation, the changes are produced by a hormone generated by the ovary. When this substance becomes too concentrated or virulent to be sufficiently neutralized, or when its elimination is rendered difficult by its poisonous effect upon the tissues of the excretory organs which may have some preexisting incapacity for performing their normal function, then symptoms of toxemia occur which closely resemble those which are to be met with in some cases of pregnancy. There is headache, vomiting, migratory pains, malaise, and constipation, all occurring just before or at the beginning of menstruation, at a time when the chemical substance is circulating in the blood serum. When elimination takes place, as partly occurs when the hemorrhagic flow from the uterine mucosa is established, the symptoms disappear. In some cases by dilating the congenitally atresic cervical canal and stimulating the mucosa by curettage, the toxemia is cured. The ovary is said to be the source of the secretion, but it has not been definitely ascertained how far the uterine mucosa is concerned. It is quite possible that the mucosa may secrete a definite chemical substance of its own which may affect the organism, or it may fail to eliminate the secretion generated by the ovary. It is not known why normal menstrual fluid does not coagulate unless some damage to the uterine tissue is associated with it. The absence of fibrin ferment is only a partial explanation, there must be a definite chemical substance present which has an inhibitory effect upon the production of fibrin ferment in this region. Treatment of menstrual disorders by glandular extracts also goes to prove the correlation between these organs.

The new graft of ovum closely resembles in its effect that occurring in menstruation due to ovarian secretion. If metabolic function is normal the maternal organism is scarcely affected, indeed in some cases pregnancy has a stimulating or rejuvenating effect upon the organism and improves the physiological welfare of the individual. If the secretion from the trophodermic cellular tissue of the ovum is in excess, the symptoms of toxemia arise which resemble in an intensified form those of menstruation. If the ovum is engrafted upon the uterine decidua of a healthy individual the endocrinous organs are little affected or only thrown out of balance for the moment. They soon recover their equilibrium and adjust themselves to one another, and to the new conditions with the internal secretory organ which has been thrust upon them. It is success or failure in the promotion of this balance between the preexisting organs and the temporary "lodger" that decides whether the pregnancy is to be a physiological or a pathological one.

Although we have not reduced the secretion of the ovum to a chemical formula, or, indeed, isolated it in any way with the exception of Abderhalden's work which, although open to question deserves the merit of being a step in the right direction—we have considerable circumstantial evidence of a clinical and chemical nature to justify the assertion that the ovum has a marked effect upon the maternal organism. Our evidence is derived mainly from the investigation of pathological conditions, which indicate—although not always accurately—normal functions by making allowance for exaggeration. We require an enormous amount of patient clinical and laboratory research into the physiological changes caused by the developing ovum. We have very little knowledge of the function of the decidua further than that it is an embedding organ. It must play an important part in the maintenance of the growth and health of the ovum. The decidual changes also bear an analogy to those which occur in the premenstrual and menstrual phases, although, with the exception of the suprarenal secretion, no definite analyzed chemical substance has been isolated from the other endocrinous organs. In the case of the ovum fragments of chorionic villi have been found in the blood stream and further point to a definite secretion. The pituitary and the thyroid have definite secretions which cause physiological changes to occur. Perhaps in the future the investigation of the secretions from the reproductive glands will be found to be more complex with regard to their effect upon the organism and more especially their psychological influences. It has been shown by a considerable number of research workers that there is a marked relationship between the corpus luteum and the ovum and that the latter is more or less sponsored by the new structure in the ovary. Experiments have been made to prove the occurrence of abortion after extirpation of the corpus luteum has taken place, but this requires further investigation. The corpus luteum is said to have a marked effect upon mammary growth and secretion and to inhibit ovulation. Lactation is not established until the termination of pregnancy when the ovum has left the uterus, and its supposed inhibitory effect has been removed. The fact that lactation and pregnancy may occur at the same time raises a question as to the supposed inhibitory powers of the ovum in the uterus.

Contradictions and diversity of opinions in research work are the soul of the undertaking, they not only show the difficulties we encounter in dragging the mysteries from Nature, but they stimulate the personal element in the worker, if not to find out a definite truth, at least to question the assertions of others. Hence a healthy completion leads to the attainment of knowledge in the end. We discuss the hormones of the internal secretory organs which we might just as readily call *X*, or the unknown quantity. The ovum secretes a destructive chemical substance and this is shown by the histological examination of the areas of coagulation necrosis and erosion of the capillaries to be found in the enormously thickened decidua of the uterus. This tissue separates the plasmodial trophoderm from the uterine wall which is carefully guarded against any further inroads by the barrier of round celled infiltration. In extrauterine embedding of the ovum this barrier is ill maintained, owing to the anatomical structure of the tube or whatever tissue in which the ovum may be placed, hence the early rupture of the tube in ectopic pregnancy, due in the majority of cases to erosion of the wall. Experiments as to the injection of placental extracts into laboratory animals have been hitherto of little help as their effect is masked by various other chemical changes apart from their specialized nature. The enlargement of the thyroid, pituitary and adrenal cortex in pregnancy proves the functional harmony between the ovum and the internal secretory organs, this enlargement being in the nature of a work hypertrophy. The endocrinous organs pour their secretion into the blood stream and therefore change its chemical composition although there is little local evidence to prove this statement. The local changes in connection with the ovum are much more obvious although no substance has been isolated which might compare with adrenalin, pituitrin, or the lately isolated thyroxin. The ovum may be a stimulant and regulator of metabolism on the one hand, and on the other may be a parasite upon the maternal host. In clinical experience we find that, with the exception of cases of acute toxemia, the ovum's interests as a rule are sacrificed by Nature to those of the mother. If an internal secretory organ or pair of organs is removed or diseased the others will take on its functions so as to maintain the physiological balance, in the same way all the organs endeavor by the compensatory hypertrophy of added strain to either inhibit the injurious effect of the ovum or to enable it to maintain its position among them for its normal duration of time. Derangements of metabolism occur in early pregnancy such as vomiting, constipation, and these are usually put down to the extreme chemical activity of the trophodermic cells; as soon as this activity becomes lessened the maternal organism shows little discomfort until the latter end of pregnancy. It is possible that the early symptoms are mainly due to the loss of balance between the internal secretory organs, and that as pregnancy advances they gradually regain their normal functions. Midpregnancy shows less disturbance as a rule than any other time. Towards the end the balance may again be upset by the stress and strain of the large ovum or of the failure of elimination by the excretory organs. Toxemia may result and we have as an example eclampsia which is due to a much more virulent toxin than that occurring in early pregnancy. The ovary which is the source of the menstrual function secondary female characteristics and of ova, may cause changes which imitate to a certain extent those of pregnancy. In ovarian tumors amenorrhea may occur and breast changes with secretion of fluid from the nipples and associated congestive enlargement of the uterus.

The ovary is concerned with the malnutrition found in osteomalacia and pregnancy has also an influence upon this disease. The ovary is involved with the thyroid in calcium metabolism and its storage in the later months of pregnancy. The pituitary is enlarged after oophorectomy and parathyroidectomy and in pregnancy. The adrenal cortex is enlarged in pregnancy and pigmentary changes occur in the skin. The blood pressure is raised in pregnancy; nitrogen changes in the maternal metabolism and the glycogenic function of the ovum together with the sugar changes in pregnancy are being investigated with a view to elucidate the metabolism of the carbohydrates. The internal secretory organs are protective in their function for the maternal organism but the ovum mainly looks after its own interests. Although the ovum is only a temporary sojourner in the maternal organism, it has some claim to being included among the organs of internal secretion.

Anaphylaxis of Thymic Origin with Status Lymphaticus in a Case of Cholecystitis with Jaundice

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Among the many most interesting gallbladder operations with an endocrinological phase which I had occasion to perform, no other case demonstrates clinically and etiologically the dyscrasias of endocrinology as the one I am about to analyze. Both in its pathogenesis and clinical manifestations it showed a typical instance of status lymphaticus, hyperplasia of the lymphatic system with a possible persistent thymus and aggravated symptoms of Basedow's disease.

It is interesting right from the start to ask ourselves, "Does the hypertrophied diseased thyroid function in antagonism to the hypertrophied thymus?"

Case.—Patient, Mrs. S., aged thirty-eight, was operated upon in February, 1917, at St. Mark's Hospital, New York. Her occupation was a housewife. A diagnosis of cholecystitis and icterus was made and a cholecystostomy was performed. The manifold psychic and nervous phenomena dated back indefinitely. There was a history of extreme emotions, worries, fatigue, loss of memory and consciousness at short intervals, hysteria, trembling, pallor and redness, with respiratory difficulties, choking sensations and difficulty in swallowing, pressure in chest and hoarseness. During and after her last pregnancy genuine gallstone colic attacks with vomiting were present. In one of her last attacks she vomited bile and blood. One attack lasted sixteen hours. She described her feeling as carrying a foreign body of piercing character which was trying to force its way out. She often became unconscious, sweated profusely, with skin eruption and frequent urination alternating with complete suppression. Her speech was nervous and inarticulate.

Inspection revealed a very thin woman with irregular bones. Her face was cyanotic, puffy and swollen. The sclera were jaundiced and the skin color was from a yellow tinge to an ashen grey. The thyroid gland was enlarged, tonsils extremely swollen, tongue dry, and both parotids were hypertrophied and tender. There was a marked exophthalmos. The gallbladder region was very tender and painful, and there was general meteorism and rigidity. There was no definite mass. Marked nervous sensory disturbances, burning prickling sensations, dimness of vision were present. The temperature was 101°, pulse 130. There was a marked tremor with chills and rattling of teeth. She complained of an excruciating pain in the abdomen, and morphine hypodermically administered brought on severe colicky attacks of an agonizing nature. Consequently potassium bromide with chloral hydrate was administered by rectum the night before operation to secure sleep.

Local anesthesia of novocaine and adrenalin one half per cent. solution in combination with ether and oxygen was given by a specialist in anesthesia. The abdomen was opened and revealed a thickened, callous, inflamed peritoneum which was matted together with anterior surface of the gallbladder and lower margin of liver. The agglutinated omentum with lower margin of the liver slipped into the wound. Gently palpating the gallbladder, it was felt well fixed and covered by hyperplastic, lymphatic tissue and lymphatic vessels of a tremendous size. There were hemorrhages and ecchymosis over the peritoneal covering. In spite of the most delicate and cautious attempt to free the adhesions at the start, alarming parenchymatous hemorrhage started so suddenly that an attempt to tie and clamp the bleeding points aggravated the condition. Here I stood between Scylla and Charybdis. On one hand, shocking hemorrhage, and on the other, vital forces at so low an ebb as to make an additional intraperitoneal manipulation fatal. With the aid of hot compresses we controlled the situation, when the gallbladder was again gently palpated and inspected as a round soft mass with hemorrhagic areas overlapping the serous membrane. Here we observed the sudden escape of a bloody liquid mixed with bile, blood coagula from one area or an opening leading into the gallbladder. An exploratory puncture by the same route through the omentum or bladder revealed the same mixture. We readjusted the protective towels to protect the general cavity and gently manipulating, mostly with the finger, I enlarged the opening of the gallbladder, removing a large brittle stone which crumbled under my finger. The choledochus and hepaticus ducts were palpated and probed gently and found to be normal and free. After the introduction of a rubber tube, which was tied and fixed with the overlapping peritoneum, a cigarette drain of rubber tissue and gauze was added. The abdomen was quickly closed. The patient left the operating room in comparatively good condition, came out of the anesthesia and about two hours later a change in respiration occurred. The respiratory movement gradually decreased in extent and rapidity, then for several seconds there was apnea, followed by feeble respiration and dyspnea for a few minutes. Then there was a normal period of respiration, then one of secondary rhythm and dyspneic respiration alternating with apnea.

In spite of strong camphor injections, artificial breathing, hypodermoclysis and the repeated use of ten minims of adrenalin of one in a thousand solution, well diluted and intravenously introduced, the patient died.

In addition to the respiratory symptoms which presented a classic picture of the Cheynes-Stokes type the reflex condition of the pupils presented an interesting phenomenon. Concurrently with the respiratory changes in the breathing pause, the pupils were like pin points, sure to dilate promptly as soon as respiration started, and again to remain in maximal dilatation during the respiratory amplitude. In the same manner the palpebral and nasal reflexes had disappeared in the respiratory pause, to return again in the amplitude.

DISCUSSION.

Concerning the nature of this sort of breathing, the socalled Cheynes-Stokes, there are a number of hypotheses. The most probable theory is overloading of the blood with carbon dioxide, with consequent paralysis and excitation of the respiratory centre. The centre which controls the pupil is in the neighborhood of the respiratory centre—the bulbous. We may therefore assume that this kind of breathing is a bulbar phenomenon. The acute infection of the nervous system could be explained that organic or inorganic substances, which are present in the lymph spaces of the nerves, chiefly through the posterior roots, are carried centripetally in the direction toward the medulla and meninges. Bacteria and toxins which enter in this way cause changes in the gray and white substance, particularly in the posterior root, toxic changes in the ganglion cells, extravasation of blood, cell infiltration of tissue and perivascular spaces, proliferation of neuroglia cells, and parenchymatous degeneration.

What rôle have the various endocrines played in this symptom complex? For instance, the thyroid. Did the thyroid hypertrophy to antagonize the thymus? That the latter gland was existent I deduct from the condition of proved status lymphaticus with tremendous hyperplasia of lymphatic vessels, tissue and glands, the hemorrhagic diathesis, the condition of hemophilia, the respiratory (bulbar) phenomena, pupillary reactions, exophthalmos, defective speech, difficulty in swallowing, loss of consciousness, hoarseness, chest pressure, demonstrate clearly pluriglandular insufficiencies, a failure to supply necessary secretory substances for immunity, and the cause of the present anaphylaxis.

The exact knowledge, the accurate determination of the particular rôle of the individual glands of internal secretion, the relation to each other, the effect of their toxins and their antibodies in causing anaphylaxis or immunity, are vital questions which stir the whole biological world, comprising all branches of medicine in its fundamental principles of life. The syndromes of disease are fundamentally associated and basically interdependent upon the glands of internal secretion and interchange the rôle of cause and effect.

The obscure latency of infection in an individual, or the condition which would permit a certain infection to occur, depends directly upon the internal secretion and upon the biological condition of the infecting agent. The causes of vacillation of virulence of pathological agencies or infecting stimuli depend upon their adaptability to the conditions of life, that is, to the function of the glands of internal secretion. The course and the gravity depend upon the resistance or defense power of the glands of internal secretion, that is, the supply of immunizing substances, and also upon the intensity of pathogenic germs, their course in the circulation, and last but not least upon the idiosyncrasy, the mental and physical character of the individual. Not every person is predisposed to the same diseases. Persons who are weakened by other disease are less resistant. The chief and main reason for anaphylaxis and immunity is based fundamentally upon the greater or lesser resistance, that is, the defense power of glands, the physiological or pathological function of all glands of internal secretion, their production of immunizing substances, or their pathogenic hyperfunction in secreting toxins; in other words, the presence or absence exciting external or internal stimuli which act deleteriously upon their function.

Immunity or anaphylaxis is transmitted from parent to offspring, but the use of the term inheritance should be reserved for the biological and endocrinological manifestations which are intimately connected with the continuity of the germ plasm and not upon the transmission of infectious causes from parent to fetus, although the latter infections can be transmitted through the germ cells of parent through ovum or spermatozoon germinal infection, or from mother through placenta, that is placental infection.

The power of absorption varies in different individuals. Experiments have shown that, with the aid of a culture filtrate perfectly free from bacteria and absolutely sterile in nature, inflammation can be produced. It has also been shown that such inflammation is produced through the agency of latent poisons in the protoplasm and by the internal secretion of protoplasm which undergoes primary necrosis and in this way prepares the field for the future growth of bacteria. These bacteria by means of so-called aggressin, a substance assumed to be an endotoxin liberated in consequence of bacteriolysis, represses the activity of the phagocytes and so weakens the resisting power of the organism to this infection. On the other hand, we see that by its latency the healthy organism enjoys a power of defense against infection producing agents, as, for instance, we have found the presence of Klebs-Loeffler bacilli in perfectly healthy individuals. When such bacilli or other pathogenic germs come in contact with the body, conditions must favor their penetration and development before an infection is produced, and it is by means of these conditions that the body defends itself. All these various processes of life, which depend upon the endocrines, leaving out the rôle of the thyroid and parathyroid in human metabolism as an important example of hormone quintessence, might utilize the ferment oxidase or adrenal products supposed to supply all tissues with oxygen, or another secretion of the adrenals, bringing about the oxygenation of the blood in the lungs. This shows that, directly and indirectly, all life in every phase is interdependent and controlled by all the endocrines in that there is no branch of medicine that can be dealt with independent of them.

Endocrinology embraces the study of all phases of human life and is the science of all sciences. We are reaching a point where we begin to see light, but each and every one can only learn what he can in his own work, in individual thinking, or in cooperative efforts. But only in mutual cooperation with well observed and proved facts can we hope to succeed in compiling all knowledge of the various departments of medicine into one picture in a broad minded sense, independent of the particular specialty with which one is engrossed, in order to improve our diagnostic ability and with it have openminded consideration for the benefit of mankind.

CONCLUSION.

1. Status lymphaticus occurs quite frequently at all ages. The rôle of the persistent thymus was indicated by the pathological findings at the operation, e. g., the swelling of the lymphatic vessels, hyperplasia of lymph glands and lymphatic tissue. The depression of the respiratory system, the bulbar phenomena point the same way.

2. The circulatory disturbances, deficient oxidation, the hemophilic diathesis, indicate dysfunction of the adrenals.

3. It is my belief that the thyroid gland, as the great defender in compensation for other glandular deficiencies, hypertrophied in antagonism particularly to the action of the persistent thymus and other lymphatic hyperplasias.

4. Icterus in this case was not due to mechanical or inflammatory obstruction of the common or hepatic duct, because the ducts were found normal and free and noninflamed. Besides, the stone found was so large that it could not escape its prison through the cystic duct. As it is doubtful if such a systemic jaundice could happen by spread from gallbladder into surrounding tissues, this ashy gray discoloration of the skin, with congestion and swelling of face and nose, point partly to endocrine trouble and internal secretion and excretion of skin and kidneys. The accumulation of bile salts in the system affect metabolism and prolongs clotting time of the blood.

5. The interchange of the relation of the infections to the endocrines, the interchange of rôle of cause and effect, the glandular swelling as the result of the general affection, were shown here in the swelling of the parotids and thyroid glands.

6. The strong rôle of infection upon the nervous system and endocrines and the psychic influence are most important. Psychic disturbances act most disastrously upon human metabolism. They are dangerous risks in surgery.

7. It is hopeless to operate in conditions of infection with advanced pluriglandular degeneration, metabolic dysfunctions, and conditions of status lymphaticus. Endocrinology embraces all human

sciences, touches directly on all specialties in medicine, basic and fundamental, and there is no sense in separating it from other fields.

8. Hope lies in future cooperative advanced work, prophylactic measures and new light upon the subject of anaphylaxis, immunity, serum therapy and organotherapy. The surgeon will help solve problems of internal secretion, together with all medical men, the internists, neurologists, bacteriologists and pathologists.

9. Profound emotions, a strong fear, produce structural changes. In normal life, internal secretions produced by psychic stimuli act physiologically and defensively. In an overdose, they act depressively and even fatally, especially in operations on anaphylactic patients with metabolic intoxications. Such additional toxic depressive secretions produce an exaggeration of intoxications which lead to fall of blood pressure, shock and death. The immediate cause of such sudden death is sought in mechanical influences of the thymus gland and the innominate artery which embraces the trachea, and also the mechanical influences on the vagus nerve and heart. But the real fundamental explanation lies in the hyperthymization or autoinfection through insufficiency of the lymphatic glands to incorporate products of assimilation, or because of the presence of the condition of chromaffinopathy, e. g., defective development of chromaffin cells or bodies in the sympathetic nervous system (paraganglia) and in the adrenal medulla, and in the insufficient supply of the hormone epinephrine and adrenalin. In other words, there is a hypoplasia of the chromaffin apparatus.

From a prophylactic point of view in patients with deficient calcium, calcium lactate does not give the desired effects, as its use will even increase the delay in the clotting time. Adrenalin locally applied to bleeding surfaces does harm and aggravates bleeding. The best prophylactic is fresh human serum from a healthy donor injected subcutaneously in doses of from ten c. c. to one hundred c. c. daily. Fresh serum locally applied in active bleeding gives unexpectedly good results. Corpus luteum extracts, as well as pituitary, have lately given good results. The use of local anesthesia with novocaine and adrenalin is one of the most important prophylactics to prevent shock stimuli to the brain. Adrenalin also acts as a hemostatic.

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Goitre

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Among the many interesting and complex subjects in medicine the unravelling of the mystery of goitre might be said to hold a special place. Goitre here is meant to include any enlargement of the thyroid except such as is due to malignancy and encapsulated adenoma, and is classified into types which show thyrotoxic symptoms, however slight, and those which show no symptoms at all or those of deficient thyroid activity. Exophthalmic goitre, according to my views, is only the extreme degree of thyrotoxic goitre, as there is no border line between the two. Goitre with signs of hypothyroidism or hyperthyroidism is in each case a hypertrophy to meet some demand.

Various and diverse views have been put forward, each of which having undoubtedly some significance in the rôle of goitre and as such cannot be ignored. Consequently in attempting to lay bare the etiology of goitre and its method of operating all these various factors must be explainable and fall into place with harmony.

Of the factors intimately associated with goitre, and to which general acceptance cannot be denied, we have the following: Calcium deficiencies and excesses, iodine deficiencies and excesses, infections and toxins, congenital conditions and locality. These factors seemingly have very little relationship to one another, yet must all be explainable and dovetailed into their respective places before any possible solution can be arrived at. It is inconceivable that goitre is due to several independent causes, as in the past it has always been found that one cause is responsible for one disease, and so we must expect to find one cause for goitre in general, but modified by other factors. The object of this paper is to try and link up these seemingly diverse factors and to show how they influence and modify goitre. Now in the balance between iodine and calcium many of our body colloids are intimately concerned and that this has a distinct bearing on goitre the following will show:

Many organic colloids are dependent upon calcium for their high viscosity, the more calcium the greater the viscosity. This may be readily shown by diluting the white of an egg with a litre of water, then adding varying quantities of a calcium solution; on boiling, the precipitate will be in ratio to the amount of calcium present. The addition of iodine to a colloid gel such as gelatine, beyond a certain point, reduces its rigidity, sufficient will liquefy it. Such colloid is capable of absorbing a fair amount of iodine before liquefaction occurs. If sufficient iodine is added to a solution of gelatine to prevent it setting and calcium lactate is added in quantity sufficient not only to precipitate all the iodine as calcium iodide but also to combine in the form of colloid, it will again set rigid. Thus many colloids which solidify into a jelly are in combination with calcium. If the calcium in milk is removed no clotting will occur with rennin and if the calcium salts are diminished in blood the viscosity is reduced and coagulation delayed so one must accept the fact that the viscosity of many body colloids is controlled by the balance of calcium and iodine.

From these statements we conclude that the balance between calcium and iodine is a very important matter within the body. As an extraordinary amount of colloidal blood and body substances contain calcium we must realize that the amount of available iodine for the system is a very important factor, so we would expect to find an elimination of calcium with excess of iodine and a retention with diminution of it. Clinical evidence and research tend to confirm these views.

There are large areas of the world where goitre is very prevalent; these are chiefly limestone districts and the relationship between goitre and such localities cannot be denied. The goitre found there is usually of the large type, which may be very big and if accompanied with any symptoms it is with those of hypothyroidism and cretinism.

The relationship between calcium and goitre has never been satisfactorily explained, yet its connection with goitre is too obvious to defy denial. People living in these limestone areas must of a necessity ingest a large quantity of calcium and must have their tissues as saturated with calcium as it is possible for them to hold. In such districts the drinking water is invariably obtained from wells or streams. Is it possible to oversaturate the body with calcium beyond the normal limit? We know this to be possible with magnesium, potassium and sodium. If this is so, then these people have that mechanism for eliminating calcium taxed to its limit. There is no mechanism of the body which is not liable to go wrong. In support of the view that it is possible to oversaturate the body with calcium the following case may be of interest.

CASE.—Mrs. C., aged twenty-seven, with exophthalmic goitre, became pregnant, and during gestation she was given calcium lactate in doses of ten grains three times a day before meals. Towards the latter months there developed a hard edema, which was general in character, not pitting on pressure. She was quite well and as the urine was satisfactory as regards freedom from albumin no apprehension was felt. Within twenty-four hours of her confinement she passed large quantities of urine and the swelling rapidly vanished; the condition being similar to the rapid thinning of myxedematous people when put on thyroid extract containing a good percentage of iodine. This swelling is jellylike and not fluid as shown by lack of pitting on pressure. A reasonable explanation for the sudden loss of swelling after delivery, is that during gestation the thyroid being faulty had more work than it could properly carry out in excreting the toxins of pregnancy and also that of the fetus, but on delivery the thyroid then had sufficient available iodine to function properly. This would also suggest that myxedema may be due to accumulation of colloid rich in calcium salts held up within the tissues, which in the presence of iodine in the form of thyroiodine is rapidly absorbed owing to the antagonizing action of the iodine to the calcium and its liquefaction of the colloid. That this is dependent upon the iodine in the thyroid extract is shown by the fact that thyroid extract with low iodine content is therapeutically of no value.

It is recognized that people suffering from hyperthyroidism excrete calcium rapidly, having excess iodine in their thyroid colloid. This is not to be surprised at if these premises are correct. With the type of goitre showing symptoms of hypothyroidism and having a low iodine content there would naturally tend to be a retention of calcium salts within the body and an increased viscosity of all calcium containing colloids.

The result of excessive doses of iodides frequently shows as a petechial rash. In this there is every suggestion of deficient coagulability of blood. As calcium is one of the main factors in coagulability and in view of the fact that when there is increased iodine content of thyroid secretion there is increased calcium output one would be inclined to hold the view that the excess of iodides had diminished the calcium content of the blood, resulting in small hemorrhages. Also with increased iodine content and diminished calcium content there would be a tendency for reduction of viscosity of all calcium-containing colloids within the body. How far this may conduce to the stretching of tissues as seen in visceroptosis lax ligaments and general loss of tone of tissues is worthy of consideration.

The foregoing would suggest that it is possible for the body to be oversaturated with calcium, and that the iodine element in combination with colloid as thyroiodine converts it into such a state as to allow of its being readily excreted; failing this it is held within the tissues as the hard edema of myxedema. If these large goitres are cut into, masses of colloid can be evacuated, yet the individual shows signs of hypothyroidism. Give these patients iodine or thyroiodine and, unless advanced degenerative changes have been established, the goitre will subside. The iodine liquefies the colloid and allows of its absorption into the system.

Research has shown that the colloid of the large Swiss and Derbyshire goitres as well as those in other limestone districts to be low in iodine content. Owing to its high viscosity or, shall we say, rigidity, the colloid is not available to the body. The rigidity in this case being due to low iodine content as is shown by its ready absorption under iodine administration and the fact that the thyroid colloid does not contain calcium.

In the southern parts of Victoria, again in hilly country, goitre is prevalent but it is marked with symptoms of hyperthyroidism, in contradiction to the previous mentioned type, and, curiously enough, there is a deficiency of lime in the district; also the people being a rainwater drinking community do not avail themselves of what little there may be in the soil. There is also a great deficiency of phosphorus. Has this type of goitre any relationship with lack of lime? A certain amount of calcium is essential to the body's needs and harm must result if it is not forthcoming. Animals fed on a calcium diet call upon the calcium in their bones to keep the calcium of the blood as near its normal mark as possible.

Practising for some years in this district I noticed goitrous women were prone to severe postpartum hemorrhage and there was marked delay in the coagulation time. This defective clotting suggested lack of calcium so in all subsequent cases calcium was given during gestation, with the result that patients who had previously bled profusely subsequently lost only a normal amount or hardly any. On treating many of these patients with calcium lactate much improvement was noticed both in the goitre and general condition; an increase in weight being most marked. One child with a goitre grew one inch within a month when first put on calcium treatment. It has been stated there is always sufficient calcium available in a general diet for the body's needs. People in the district mentioned drink rainwater entirely. They are a dairying community and as such do not readily drink milk, the children from having so much to do with it take an instinctive dislike to it. They have very little spare time to grow vegetables, so their chances of getting a good supply of calcium, even if the soil contained it, are limited. Most of those with goitre if asked if they drink milk, say no. Surgeons accustomed to removing tonsils in cases showing hyperactivity of thyroid have good cause to know how readily they bleed and insist on the exhibition of calcium salts for some days prior to the operation. Clinical experience has shown us the benefit of calcium in goitre cases with toxic absorption and experiment has shown a marked output of calcium salts with increased thyroid activity, so in these cases of goitre there is more need than ever to have a liberal supply of available calcium and a shortage would be obviously harmful. There is some evidence then to suggest that the body may not get sufficient calcium for its proper well being. The inhabitants of this district are of a type, tall, lanky, and thin, with no stamina—nothing robust or virile about them. The same may be said of stock bred in the district, particularly horses. It is also a wellknown fact that limestone districts are the best for stock breeding.

Comparing these goitres with the previous type, one finds they are seldom large, often small, extremely vascular, vesicles empty, but with signs of hyperthyroidism; which condition is associated with an increased iodine content of colloid. Empty vesicles and increased iodine content, compared with the large masses of colloid and low iodine content of the previous type. It surely looks as if the iodine has some important rôle to play in the proceedings. Empty vesicles because the colloid is too thin to be held within the spaces. If such patients are treated with thyroiodine their symptoms are much increased.

SOURCES OF DISTURBANCE.

Now, of these two factors, calcium and iodine, it may be asked are they both at fault or only one? In the type of goitre as found in limestone districts the colloid shows low iodine content, while in the type found in districts deficient in lime the colloid shows a high iodine content. Here let me state that I do not wish to assume that every goitre in Gippsland is of the hyperthyroid type but that the great majority show signs of overactivity. There are areas in Victoria where limestone is abundant and goitre endemic, such as Mansfield, and also on the East coast of New South Wales; these are benefited by iodine in some form or other.

The only conclusions one can come to are that as there are areas rich and poor in calcium, so there must be areas rich and poor in iodine, and that it is possible to have a district rich in calcium and poor in iodine as well as one rich in iodine and poor in calcium. Should these factors obtain it is highly probable that the thyroid metabolism will be interfered with.

Smith (1) has noticed in certain districts of Montana that litters of pigs are often born hairless and that great numbers are stillborn. He finds a deficient iodine content in the thyroid colloid and also that this is more marked during the winter months, and that dry foods contain less iodine than green ones. The cases present pronounced hyperplasia of the gland with a great multiplication of the cells of the interstitial tissue and so can reasonably be classed under the heading of goitre. Because there is a low iodine content can it be said that these goitres were dependent upon that factor alone? I do not think so, nor do I think it is dependent upon deficiencies or excesses of calcium. There must yet be one common factor to all forms of goitre to prove the case, because after all there is increased manufacture of colloid in both the hyperthyroid and hypothyroid types of goitre. In one the colloid, on account of its fluidity, continually enters the blood and in the other, on account of its rigidity remains in the gland. So far then the balance between the calcium and iodine content of the colloid has a very important bearing on the production of goitre.

HEREDITY AND CONGENITAL CONDITIONS.

McCarrison (2) mentions that if a healthy pregnant bitch has a large portion of her thyroid removed the pups are likely to be born with goitres.

A few years ago I (3) published with photographs a series of children born with goitres, all from goitrous mothers. It is known that there is no iodine in the thyroid of the newborn and that during gestation the mother's thyroid does duty for herself and the fetus and if the supply from that source is diminished, the fetal thyroids will try to hypertrophy and meet the demands thrown upon them; if they can, they live; if not, they die, and are stillborn as is so often the case. Smith says the loss of young pigs from this cause in Montana alone is about a million annually.

Now, given a breed of pigs in which iodine is excluded from the diet, that is, by cutting out green foods, and born of parents with deficient iodine content of their thyroid colloid thereby causing excessive rigidity of the thyroid colloid and so making it not available for use, a condition arises which is equivalent to the experiment in the bitch. This will be analogous to the cretinism of the Swiss Valleys.

From the above we must conclude that an offspring born of a mother with hypothyroidism stands a chance of being born with a goitre or inherits some tendency for the development of goitre.

The toxic view of goitre is very much enhanced by this production of goitre in offsprings of a partially thyroidectomized healthy parent, as it strengthens the view of the thyroid secretion being used to neutralize or excrete some toxic substance which would otherwise accumulate and destroy the organism.

TOXINS AND INFECTIONS.

Up to the present there has been no direct evidence that any of the foregoing are directly responsible for goitre but they undoubtedly play an important rôle. Many views have been put forward as to the function of the thyroid and unquestionably they are complex. If we consider goitre a hypertrophy to meet some demands, and rightly so, under what conditions does it hypertrophy? It is only by investigating such conditions can we hope to arrive at a conclusion. Abundant evidence in the past has shown how toxins and infections have produced hypertrophy of the gland.

Trout (4) bred in crowded hatcheries with insufficient water supply developed goitre which vanished on limiting the numbers and increasing the supply of fresh water. Rats (5) injected with feces from healthy rats even after sterilization showed hyperplasia of the thyroid. Rupert Farrant (6) found the same hypertrophy in animals by injecting abrin and ricin, also toxins of certain bacteria. McCarrison (7) found in certain parts of India that an intestinal bacterium was responsible for the production of goitre, which was curable either by a vaccine made from same or by an intestinal antiseptic such as thymol. Dr. Carlo Chagas (8) found in Brazil that goitre was due to a trypanosoma.

Rupert Farrant on one side of the world and myself on the other, unknown to one another, were both investigating on the same lines, and found that practically all cases of goitre with thyrotoxic symptoms have some focal infection. I use the words practically all, because it is easy to overlook some small focal infection and it need be a very small one to give trouble; also as so many show it, one would naturally expect to find it in the others. A few infected cells of the nasal accessory sinuses, without any gross mucoprevalent discharge are easily overlooked, even a narrow nose with pressure setting up catarrhal conditions convert the normal floral of the nasal cavities in active and virulent bacteria. There are also many parts of the body in which a small focus of infection may lie hidden and never be diagnosed, such as the head of the pancreas, gallbladder, lingual tonsils, apical abscess of the teeth, prostate, or diverticulitis of colon, etc. The possibility of syphilis as an infecting agent must not be lost sight of. It is on this account almost impossible to say definitely that such and such a case of goitre has no infective process. Sudden fright and shock have produced goitres, but in these cases it will probably be found that they had focal infections and were already on the border line. How many hundreds of patients does one meet showing signs of hyperthyroidism, by which I mean mild as well as severe cases of overactivity of the thyroid as evidenced by the toxic syndrome, tachycardia, tremor and a highly tuned up nervous system, but showing no actual enlargement of the thyroid, yet all with focal infections. Clinically, there is no difference between these cases and those which show some thyroid hypertrophy.

With tuberculosis in young people the thyroid is frequently found hypertrophied. As a final argument it may be mentioned that the only way enlargement of the thyroid which has been produced experimentally is by injection of bacteria or their toxins, or vegetables toxins, such as abrin and ricin.

I would like to assert here that there is no such thing as physiological enlargement, in all such cases a focal infection will be found if diligently sought for. Such facts suggest that one of the main duties of the thyroid is to deal with toxins of bacteria, or from other sources.

As further evidence we have the fact that the thyroid of pregnant women is frequently enlarged owing to having extra work to do to clear the body of toxic products of metabolism. It is a well known fact that people suffering from hypothyroidism and cretins have very little resisting power to disease. Children born of such parents readily succumb to such disease as tuberculosis. Women with hypothyroidism are prone to albuminuria of pregnancy and eclampsia because they are unable to deal with the accumulated toxins. On two occasions I have seen apparently healthy young women at their first confinements with eclampsia and I found each of their mothers to show marked signs of hypothyroidism.

As final evidence I would state that goitres in which it is possible to remove completely the infective process, are readily cured with appropriate treatment without resorting to operation. In the milder cases removal of the focal infection and adequate supply of calcium or iodine, as the case may demand, is quite sufficient. From the above we have a fair right to deduce that the thyroid is called up to do extra work in the presence of certain toxins, be they bacterial or toxins of metabolism. Under normal conditions in the presence of toxins the thyroid can and does deal with them for everybody with septic tonsils does not display a goitre. Let us take the case of a woman in a Swiss Valley with septic tonsils. Her thyroid will be called upon to do extra work, her iodine content is probably sufficient to meet ordinary demands but when extra calls are made upon it, enough is not available to liquefy the thyroid colloid, with the result that it accumulates in the spaces. Fresh demands are sent to the thyroid, more secretion is supplied until there are great masses of it in the gland. Meanwhile the woman suffers for lack of it and signs of hypothyroidism develop. The other side of the question is seen in Southern Victoria in which septic tonsils or some other focal infection has called upon the thyroid for increased secretion to deal with the toxins. Deficiency of calcium, relative excess of iodine, hence vesicles empty, secretion thin and readily entering the blood stream, in fact constantly pouring into it as it is not rigid enough to stay within the vesicles, extreme vascularity pointing to urgent demand for the right kind of secretion which is not available, still more demands and more of the iodine laden secretion till all the signs of exophthalmic goitre are produced. The virulence of the infection is a potent factor, the greater the virulence the more acute the symptoms. The infection is often of so low a grade of virulence as to produce no constitutional disturbances. From one extreme to the other goitres are produced. Some show signs of excessive thyroid absorption, others deficient thyroid absorption, and some apparently normally balanced, but still these, with a flare up of infection, are likely at times to show signs of hyperthyroidism. All, except those goitre subjects born of parents unable to eliminate their product of metabolism, show some septic focus or source of toxic absorption, if such be carefully searched for.

In the past where the exact cause for a certain disease has been unknown there has always been a multiplicity of causative factors put forward, but when the truth has been discovered this multiplicity has always been reduced to one and one only. On such an hypothesis, and it is a reasonable one, too, we must not expect to find a multiplicity of causes for goitre but one basic one for all. The toxic theory as put forward here will, I feel sure, stand the test of time and criticism.

Localities have their special infecting agencies. McCarrison found in India an intestinal bacterium responsible for goitre. There are certain goitre wells in Switzerland and Derbyshire in which may possibly be a filterable virus, or some toxic body. Some have suggested an iodine fixing compound and I would suggest that this may be calcium. It is quite possible that the goitre and cretinism in pigs, as mentioned by Smith, is due to some benign bacterium. The habit of drinking rainwater as obtains in country places in Australia, is bad owing to the foul state the tanks are likely to get into towards the end of the dry summer, and the amount of dead bacteria and bacterial products they must contain.

I have tried, with, I hope, some degree of success, to link together these various and seemingly unconnected factors in that complex condition called goitre. In the process one is led to entertain the idea that the body colloids are influenced by the iodine element of the thyroid secretion interacting with the calcium element of the body colloids. The balance between the two being essential to health. With deficiency of iodine a retention of calcium colloids resulting in increased weight and a condition known as myxedema. With excess of iodine an excretion of calcium resulting in loss of weight and reduced viscosity of body fluids and tissues, with a tendency for tissues to stretch as in visceroptosis.

REFERENCES.

1. Smith: *Endocrinology*, vol. iii, No. 11, p. 267.
2. McCarrison: *Lancet*, February 8, 1913.
3. Pern: *Australian Medical Journal*, June 21, 1913.
4. Marine and Lenhart: *Journal of Experimental Medicine*, 1910, xii, pp. 311-337.
5. Bircher, E.: *Deutsch Zeitschr. für Chir.*, 1911, cxii, p. 368.
6. Farrant: *British Medical Journal*, April, 1914.
7. McCarrison: *The Etiology of Endemic Goitre*, p. 87.
8. Carlo Chagos: *Memorias do Instituto Oswaldo Cruz*, 1909, fasiculo 2.

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Physiognomy and Endocrinology

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The appearance of the patient, using the word in its widest sense, has ever been taken into account by the thinking physician, and used as an aid, not only in the interpretation of disease but in the choice of medicines, and also, to some extent, in the application to the individual of the general expectation of the issue in partial or complete recovery, or in progressive deterioration and death; in other words, the prognosis. Long before there was a science of medicine, there was, we may be sure, an art of medical observation and interpretation. The *tactus eruditus*, to feel the pulse, to note the varying degree of warmth, of dryness, of moisture of the skin, was ably seconded by the *visus eruditus*, which scanned the skin, conjunctiva and tongue, detected slight variations from the normal in proportions and relations of parts, in distribution of hair and fat, in stature, expression, gesture, posture and gait. Some of our most accurate and dramatic delineations of clinical disease types come from the prescientific era, and it is a question whether we have not lost something of the shrewd insight of those early classical days in our almost exclusive devotion to and reliance on methods of precision and instrumental tests.

As in many other fields of human thought, the original spontaneous and fresh observations and the deductions borne out by practical experiences were at a later period, notably in the middle ages, overlaid with the pale cast of thought and elaborated, via mysticism and metaphysics, into fanciful, vague, and misleading systems of medical philosophy.

Physiognomy, as a science, went hand in hand with phrenology. Bumps were arbitrarily endowed with biological significance and acquired importance as indices of character, temperament and habit. There was postulated a characteristic expression or skull manifestation for each mental or spiritual quality, and so we find bosses and hollows corresponding not only to courage, benevolence and veracity, but to love of offspring, veneration and esthetic taste. This fanciful structure, which as we shall see, had an extremely small and insecure but actual basis in fact, neglected almost completely the study of the normal and pathological factors of skeletal and cranial growth, and the influence on skull form of rickets, syphilis, tuberculosis, chronic disease of the meninges and brain, and such processes as synostosis of the cranial sutures, or marked topographical changes in the cranial cavity, the facial skeleton, the orbits, or the accessory nasal cavities. The histological study which characterized the era of Virchow and cellular pathology cast light on these points but threw overboard the whole phrenological system of earlier times. The microscopists and autopsy table experts did not realize with sufficient clearness that man is not made of cells, alone. It was left for endocrinology to show the importance of the glands of internal secretion in the development of skull form and body structure and proportion. We recognize as definite products or results of pituitary growth, normal or morbid, those external cranial characteristics and markings which were formerly ascribed, quite naively, to virtues of the soul or graces of the mind.

In a way, this aberration of phrenology was paralleled by physiognomy, its sister science, or rather, pseudoscience. Under the influence of the older humoral pathology, physiognomy devoted itself mainly to setting up hard and fast clinical types which corresponded or were supposed to correspond to definite categories of individuals with specific qualities, manifestations and reactions to diet, drugs and disease, with appropriate susceptibilities and idiosyncrasies. In those days, mixtures and crasias were as familiar to the laity as complexes, and sublimations in our own, and men were phlegmatic, choleric, sanguine, lymphathic, atrabilious, splenetic, each with a characteristic physiognomy. A further development of the metaphysical side of this study led to analogies between human faces and those of some animals, and the ascription, in accordance with this theory, of canine, bovine or leonine traits to humans with features suggesting the dog, the ox, or the lion. Of course, there was much room left for fancy and even more for speculation, and here, too, details and facts made clear by the exact science of a later painstaking if less romantic and imaginative anatomy were misunderstood or overlooked.

The real significance of an acromegalic nose and of the facial changes in leontiasis ossea, was, of course, as a closed book. It is significant that this physiognomy devoted itself mainly, if not exclusively, to the study of the face and interpretation of its features in disease and health. This was a decided step backward not only in methodology but in the practical field as well. The old observers took in, literally, not only face but figure; not only the glance but the gait, speech, posture and typical attitudes. The bedside pictures which have come down to us from those early days are masterpieces of keen observation, terse and artistic description and shrewd intuition. Today we are beginning to realize that these observations contain much that is of value, and that we can carry out this oldest of medical methods with new applications to diagnosis and treatment by a reference to some of the basic facts of endocrinology. For us, physiognomy does not mean the face alone, but the individual in his visible entirety, in his complete externalization in every phase. This somatic physiognomy is based on heredity, structure, physiology and habitual psychology, all of which have their implications with the glands of internal secretion and with the vegetative nervous system. Another category, immunity, may also have its physiognomic bearings and, here too, the endocrine factor is of importance. It would be an interesting study to take up in detail, let us say, first, the kinetic and dynamic manifestations of the various endocrine types, meaning here the muscular activities in walking, talking and shaking hands, the characteristic attitudes in sitting, standing or lying. A second phase would deal with the rate and rhythm of activities and vital processes, the tempo of speech and glance, of pulse, respiration, metabolism in general. Such an analysis might be carried further to include the bony skeleton, the distribution of fat, of hair and of pigmentation. A synthetic study would use all the data gained by such analyses of the various categories and combine them to form pictures of endocrine or dyscrinoid types. In this field a great deal has already been done and we recognize, by various stigmata, the clinical types of the hyperthyroid, the pituitary, the myxedematous, the viraginoid, the eunuchoid, and such conditions as infantilism, prematurity, precocious adolescence and presenility.

Let us now consider the facies, *sensu strictiori*, in its endocrine bearing. It is significant that in many languages the word for face and that for eye are synonymous. Thus prosopon, the word facies itself, *Gesicht,* looks, visage indicate the twofold significance of the eye as the most important feature of the face, and at the same time, the principal means for the recognition and understanding, the perception, sensing and interpretation of itself, as a feature, and of all the others. Not only, as has been said, the mirror of the soul, but its road map, signal flag, and glossary. The glance itself, using that expression to denote the sum of motions used in visual observation and expression as in communication of data to another, has undoubtedly a racial as well as an epochal and an individual quality. The glance of the East is not that of the Western world. The child has its characteristic rate and mode of eye motion. Certain diseases are characterized by a very rapid and restless glance, or again, by a listless, dull, slow gaze which we sum up as apathetic. It is possible to arrange these types in disease groups, or, more logically from the viewpoint of this presentation, in endocrine categories. We shall find that, while we may not be able to carry the differentiation to the point of marking each dyscrinism with a definite ocular physiognomy, there is already a fairly accurate conception of the clinical picture of hyperthyroidism, hyperpituitarism, and such dispituitary syndromes as acromegaly and the adiposogenital dystrophy of Froehlich. Further, while we must admit that the relation of the vegetative nervous system to the glands of internal secretion and of both to the chromaffin structures has not been worked out to such an extent that we can definitely state which is the first, which the last, link in the chain, there are certain phenomena leading to end states of dominance in one or other division of the autonomic nervous system, so that we may speak of a vagotonic, or, on the other hand, of a sympatheticotonic physiognomy. Naturally, this nomenclature relates to the muscles of the face, the mouth and lips particularly, and to vascular states of the skin and mucous membranes but I have in mind mainly the ocular implications. To put it in a nutshell, I should say that the vagotonic eye manifestations are suggestive of inhibition. The main features are a contracted pupil; small, generally hyperopic and sunken or recessed globe and partially consequent upon this, a narrow lid fissure; slow eye movements, tendency to screwing up the lids, erroneously spoken of by some physicians and most people as squinting, exaggerated to the point of tonic blepharospasm. The sympatheticotonic eye is, quite to the contrary, full and large, slightly prominent or popeyed, with large, wide open lid fissure giving a wide awake or staring expression which may connote or register curiosity, surprise, fear or ecstasy. The pupil is large, the refraction generally myopic, and the eyeball correspondingly large. There is usually marked vascularity of the lids and conjunctiva which is in marked contrast to the cold appearance of the vagotonic eye. The hyperthyroidic eye is, as I have observed, not infrequently associated with such a definitely hypothyroid stigma as loss of the outer (temporal) third of the eyebrows and other markings no less striking. These apparent discrepancies may be logically adjusted, I believe, on the hypothesis of an original hyperthyroidism with the structural, hereditary, ocular characteristics of this endocrine dominance and a secondary hypothyroidism caused by excessive demands on the thyroid under the stress of emotions or infections. The motion of the eyes in fastening on an object and the reflex from the white sclera and the even brighter flash from the clear cornea are summed up in the word "glance" with its connotations of rapid motion and of light reflection. The individual peculiarity of the glance depends largely on the two factors of globe prominence with consecutive wideness of the lid fissure and the rate of motion of the eyes. In pituitary types, in childhood and in vagotonic states, there is a slow and deliberate quality of the eye motions which may give an expression of dreaminess, apathy or innocence to the gaze. In analogy with slow heart action of similar provenience we might speak of a bradyopia. Conversely, the sympatheticotonic states of hyperthyroidism, incipient tuberculosis and some forms of cardiovascular imbalance, are marked by frequent eye motions with smaller excursions, tachyopia. The poet's eye, in a fine frenzy rolling, may be taken as an instance of the latter; the level gaze of the judge or the commander, of the former type. In children we note a characteristic wide eyed gaze rather than a glance and this is suggested in the adult eyes of certain races, notably the Negro and Polynesian, and markedly pituitary types. The baby stare connotes the simplicity and freshness of youth, a quality unspoiled by the experiences of the world, the flesh and the devil. In both instances we have to do with a pituitary marking. This is accentuated by a wide spacing of the eyes due to definite extraocular orbital relations connected with the development of the upper nasal skeleton and the accessory nasal cavities. This broad glabella and wide level brow produce the ox eye attributed to Juno and to the heroic types of classical sculpture. Hebe, goddess of youth among the Greeks, was also represented with the broad spaced eyes and nose root just mentioned. When carried to an extreme by pathological dyscrinism, as in pituitary tumor, this oxlike expression, associated with a marked divergence of the visual axes and of the orbits, produces a decidedly disagreeable suggestion of brutishness and phlegma. In pituitary types I notice also a tendency to snub nose, the *nez retroussé* of the French and a type characterized by decided concavity of the ridge instead of the straight profile of the Greek. This is not identical or to be confounded with the saddle nose of Mongolian or specific heredity.

The interrelation of gonads and pituitary is significantly indicated by the traditional connection of a large chin, deep voice and big nose, with virility and courage. The association in the human mind of wide spaced eyes with courage and of narrow, close set eyes with cowardice or cunning is as old as the race and has very definite endocrine implications depending partly on underdevelopment of the accessory sinuses, insufficient airspace, the resultant tendency to mouth breathing, and the final production of a weak, underdeveloped, retreating chin, high palatal arch and narrow jaw. The ensemble, an adenoid face, carries a spiritual message which is certainly not that of valor or virility. Folklore and primitive art bear witness to the fact that our racial forebears learned the lesson of physiognomy and its interpretation when the race was still young. The serene beauty of classical sculpture depends ultimately on harmonic proportions expressive of hormonic balance, as the beauty of their architecture embodies mathematical relations expressive of perfect function. In the living body and still more in the face of heroic heads the student of endocrinology will note a structural balance which is the outward manifestation of the underlying harmony of the glands of internal secretion.

Our Problems in Endocrinology*

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The problems which today confront the earnest student of endocrinology and the zealous investigator into the mysteries of the ductless glands are neither few nor simple. No part of medical knowledge is more difficult to master even for its most intelligent students; in no other branch of medicine are there so many problems still to be solved, so many riddles to be explained. Notwithstanding the mass of periodical literature and the number of volumes published on the subject, it is impossible for anyone, even with the mind of an Einstein, to draw from this store much that is very concrete or substantial, because the numerous theories, corollaries and postulates set forth and the experiments described are in many instances very complicated and even contradictory. The research worker on endocrine problems has even greater difficulties to contend with, and not infrequently are his most painstaking efforts attended with failure.

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*Chairman's address to the Endocrinological Society of the City of New York.

GROWTH OF ENDOCRINOLOGY.

Endocrinology is a very young addition to medicine centuries old; it opened its eyes to the light of science but a few decades ago, and yet its progress has already been immense and its bearing on medical problems enormous. We may accord Biedl (1) the fullest right to say, "That in all the departments of biology the tenets of the internal secretions have extended themselves during the last thirty years to an unexpected expansion and depth. They have taught us that the chemical messengers of all tissues, and above all of those of the endocrine glands, are concerned with development, formation and growth, in their progressive and regressive phases, in the somatic and psychic constitution of the individual; and that the degree of activity of all the tissues, organs and systems is also more or less influenced."

Many branches of medicine had their origin many centuries ago. Many others, like bacteriology, serology and biochemistry had to await the development of other sciences and the invention of special apparatus before they could make their appearance and become factors in progressive medicine. The emergence of endocrinology has been delayed until the present time, notwithstanding the fact that the existence of the ductless glands was known for centuries past. It is surprising that famous anatomists who explored the most secret corners of the human organism failed to give more than passing attention to the glands of internal secretion; that the greatest physiologists devoted themselves to the study of the functions of every organ but the ductless glands. Like stepchildren, these were sadly neglected or ignored. Why this happened would be incomprehensible did we not know that to the early anatomists and physiologists the real importance of these glands in the animal economy was unsuspected. None, even with the boldest imagination, dreamed of the extraordinary and vital influences the ductless glands are now known to exert upon the animal organism. For centuries no one recognized their importance, no one deemed them of sufficient value to arouse interest in their study. And now, these very same glands have at last been accorded their merited place in the animal organism, and an importance ascribed to them which commands the attention of many scientists and indeed of every instructed practitioner of medicine.

DISCOVERY.

To the clinician and not to the laboratory worker belongs the glory of the discovery of the real significance of the endocrines, for when the therapeutist, Brown-Séquard, at the age of seventy-two, in 1899 announced to the Paris Biological Society his personal experiences with *liquid testiculaire*, he unwittingly disclosed to the world the powers of the ductless glands and laid the foundation of recent endocrinology. His rejuvenation experiments suddenly stimulated an interest in the endocrines, which it seemed might be a source of the fountain of youth so eagerly sought for by the Ponce de Leons of that time. Brown-Séquard's work gave an impetus to the study of the ductless glands and led to the discovery of their true function. While it is true that for centuries before Brown-Séquard's discovery it was known, from observations upon the castrated and menopaused, that the sexual glands play an important rôle in the structural makeup of the individual, it is nevertheless also true that the real functions of the internal secretions and the practical application of gland substance were unsuspected and unknown until his remarkable discovery.

ENTHUSIASM VERSUS PESSIMISM.

There are many dangers which threaten scientific progress in endocrinology and many problems which concern those truly interested in its advancement. The progress made in the past twenty years in the study of the ductless glands has been rapid. Notwithstanding many serious, often seemingly insurmountable difficulties, no little knowledge has been acquired in the laboratory, the clinic and on the operating and postmortem tables. It would consume too much time and space to enumerate all the discoveries and the wonderful achievements in the field of endocrinology. Some of these, concerning the physiology of the ductless glands and opotherapy, have been so marvelous as to create astonishment and bewilderment. But they have also caused some of us to lose our bearings and to permit imagination to render us almost ridiculous. Insignificant discoveries have been clothed with undue importance and utilized to build up towering theories without any rational basis. Many have rushed into print with pseudoscientific articles designed more for their personal enrichment and aggrandizement than to help honest research. Others again have reported wonderful cures with endocrine extracts shutting their eyes to similar results obtained in similar cases by other means.

Such overenthusiasm, either real or masked, is dangerous and more than anything else interferes with the progress of endocrinology. It serves to discredit it in the eyes of medical men, who are not fully familiar with the status of the subject; it serves as material for those who for some reason or other delight in destructive criticism of everything new in medicine, a class of practitioners who still refuse to fraternize with modern ideas. We have much to be grateful for—very much indeed—but not enough as yet to permit ourselves to go astray in overenthusiasm and exultation. Extensive as our knowledge of the endocrines is at present, it is, I believe, as insignificant in proportion to future knowledge as is a drop in the bucket of water. Enormous labor, effort and patience will have to be expended before much definite data may be hoped for. The inaccessibility of the glands and their close connection with other structures makes experimentation very difficult; their intricate interrelationship practically excludes their individual study. Surgical experimentation can only be indulged in by those who are skillful and painstaking; and the determination of the glandular active principles is no bagatelle for the biochemist. The difficulty of the task may be judged by the fact that in all these years it has been possible to isolate only two definite hormones, an adrenal separated by Takamine and a thyroidal by Kendall. It took the latter many years of hard work, under the most propitious circumstances, to give to the world only one of the active principles of the thyroid. How many others remain to be discovered in the thyroid alone, and how many may be hidden in every other endocrine, who would dare to foretell? It is my firm conviction that every ductless gland harbors a number of hormones which exert a restraining or impelling action upon some part of the organism. Whether the nature of the hormone is anabolic or catabolic makes little difference, as the terminal effect of all is directed to the good of the economy and the sustenance of life.

COMPLEXITY OF THE STUDY.

The functions of each endocrine gland are too numerous to permit the assumption that only one hormone is designated to each gland; the isolation, so far, of only one single active principle does not speak against their multiplicity. When, for example, we see that such an organ as the stomach, assigned evidently for the single purpose of digesting food, a comparatively simple function, possesses for this work a number of specific substances, such as pepsin, rennin, and hydrochloric acid, how can we rationally assume that an endocrine delegated with many extremely important, if not vital, functions should be limited in its manifold activities to only one hormone? When plants, such as digitalis with its numerous glucosides (digitoxin, digitin, digitalein, etc.) the poppy with its nineteen alkaloids (morphine, narcotin, narcein, codeine, etc.) and other specimens of the vegetable world have many active ingredients, each one undoubtedly with a purpose in the life and metabolism of the plant, may we not suppose a like complexity in the active principles of the ductless glands? It seems therefore not farfetched to assume the existence of more than one hormore, of special biochemical properties, in each of the endocrines.

Overenthusiasm is a disposition we must strive to overcome. It has called out reproach and a warning from men deeply interested in the study of this most fascinating subject. Cushing, Plummer, Hoskins and others have issued a call for conservatism in our deductions from observations and statements. Cushing defines our status correctly, though allegorically, in saying (2): "We find ourselves embarked on the fog bound and poorly charted sea of endocrinology. It is easy to lose our bearings, for we have, most of us, little knowledge of seafaring and only a vague idea of our destination. Our motives are varied: some unquestionably follow the lure of discovery; some are earnest colonizers; some have the spirit of missionaries and would spread the gospel; some are attracted merely by the prospect of gain and are running full sail before the trade winds."

Warnings such as this are timely for many adverse criticisms have lately appeared in many quarters and even as editorials in popular medical periodicals. Some are sarcastic, others biased or scornful. I might quote one of these as an example: "The functions of the socalled ductless glands have been a fascinating mystery. With changes in some of them, the thyroid, the adrenal and the pituitary, we know that certain diseases are associated and we know also that the administration of certain extracts from these glands produce some fairly definite physiological results. We know, too, that the gonads possess an internal secretion, and that the loss of these organs effects some varied phenomena." "On the basis of this meagre information and certain other observations not yet fully established, many enthusiasts have persuaded themselves that endocrinology is a well finished study. They assume to classify all individuals as of certain endocrine types and many diseases and disorders as representing hyperactivity or hypoactivity of this or that ductless gland. They proceed blithely to the cure of this or that disorder by the simple expedient of administering by mouth various mixtures of glandular extracts. They do it with an enthusiasm that is as amusing as it is amazing and their confident assurance is scarcely even ruffled by the timid suggestion that most of the extracts thus administered have no demonstrable action. Nor does it disturb their state of satisfaction to note—if they do—that some of the diseases they would treat by glandular extracts are the same diseases that other faddists would treat by extracting teeth" (3).

Such editorials are not uncommon now. It is not such statements, though, that need cause us concern; it is the overenthusiasm that needs checking, for it menaces the earnest endeavors of conscientious workers in this field of medicine. "That the literature does include an intolerable deal of twaddle no well informed reader can deny. Such pretentious nonsense might well be designated pseudoendocrinology," but "there is a class of writers who so affect the term of socalled endocrinology, the implication seeming to be either that the existence of the endocrine organs is doubtful or else that the voluminous literature pertaining to them is of such uncertain significance as not to deserve formal recognition" (4). It is these doubting Thomases whom it is our duty to convince. Their pessimism is beyond belief; they refuse to accept the simplest, fundamental truths long ago accepted by every unbiased student of medicine. Such a deplorable lack of modernity is emphasized, when college professors, prominent surgeons, and other supposedly eminent men openly proclaim, as happened at our state society meeting last winter, that endocrinology consists of ninety-five per cent "rot and nonsense." It lies with us to convince the ignorant that to "one who approaches the subject with an open mind, it is obvious that endocrinology has contributed not a few valuable diagnostic and therapeutic procedures to practical medicine" (5).

CLINICAL INVESTIGATION VERSUS LABORATORY RESEARCH.

Another faulty conception that needs revision is the belief by some that little credence can be placed in deductions from clinical observations. The laboratory worker is very suspicious of everything emanating from the clinic; he is of the opinion that the solution of all problems rests with the test tube and animal experimentation; he imagines that accuracy is obtainable only in his laboratory. Such assumptions are preposterous. The clinic is indeed the only proper place for the study of disease and the discovery of the truth concerning pathological conditions. Laboratory guides are mostly artificial, are reliable in only some instances, and are the handiwork of man. Clinical symptoms are the natural, infallible, unalterable expressions of definite states and are the ways of God. Long before the laboratory was in contemplation, the clinic enlightened the medical world. The critics forget that many well established diseases were known and successfully treated centuries ago when their etiology and pathology were still mythical. Malaria was known and treated long before Laveran discovered the plasmodium; syphilis centuries before Schaudinn first demonstrated the spirochete. So also tuberculosis, diphtheria, pneumonia, erysipelas and a host of other plagues of afflicted humanity were successfully combated long before their causation was known. And as to accuracy, what can be more accurate than a symptomatology produced by Nature and the organism itself? Nature always follows a definite course in conformity with her laws. She is invariable, but the human mind frequently misunderstands and misinterprets her ways. It is proper recognition and interpretation that are often wanting, resulting in mistaken ideas of natural events. On the other hand, laboratory results are mostly dependent upon the personal equation of the worker, and workers are not always infallible nor their work always unimpeachable.

EXPERIMENTS.

As to animal experimentation, we can depend upon it for deductions, particularly in endocrinology, even less than in other sciences, for what holds true for human protoplasm and human faculties does not always hold true for those of the animal. It is well known that a great many principles and characteristics, diseases and infections, immunities, etc., associated with the human being, are not to be found in the animal, though many others are common to both organisms. Most infectious, metabolic and constitutional disorders differ even in the individual species because of the difference in the biochemical properties of the respective animal tissues. How, then, may we always interpret information obtained in animal experimentation as applicable to human beings? It is fallacious, especially in the study of the endocrines, as previously mentioned, to expect findings obtained in animal experiments to apply precisely to human physiology. The laboratory has its function but only to supply explanations, missing links between clinical observations and pathological findings. Even if the types of endocrine disturbances (Addison's disease, Basedow's disease, eunuchoidism, myxedema, cretinism, dystrophia adiposogenitalis, and other syndromes) known to the clinician long ago, were accurately described, it is now for the laboratory worker and experimenter to disclose the mechanism by which such disturbances are induced and for experimental pharmacology to offer the means to overcome them. This constitutes a very important and practical problem, well worth the attention of all concerned. To the clinician there are still many modalities in the disturbances of the ductless glands to be identified, coordinated and studied, which will demand his attention for some time to come until fully completed.

GLANDULAR PRODUCTS.

Another important and serious problem facing us is the matter of glandular preparations. "Endocrine therapy has become very popular, perhaps too popular" (6). I use the term, important, because the results obtained in opotherapy are used as a standard to measure the efficiency of glandular therapy, and I say it is serious because some endocrinologists build physiological conclusions and establish principles based upon their observations from the use of glandular extracts. To lay down a physiological principle upon false premises and to make deductions from faulty preparations is undeniably a dangerous matter. The standardization of glandular preparations demands our immediate and serious attention. The products now in existence are far from satisfactory; most of them are crude, frequently deteriorated, disgusting, useless and even harmful. The best on the market offered by the most reliable commercial houses are quite inadequate. The standardization of endocrine preparations should become the aim of every endocrinologist; he is entitled to know the character of the material he is administering to his patients for every link in the manufacture of the glandular substance plays a vital part in its future therapeutic value, every stage in its production counts in its efficiency. It may become either a dangerously potent weapon or an inert mass. Our work, our reputation, our accomplishments, the future of endocrinology all depend upon it. Our great task is to bring about, in so far as this is possible in the present state of our knowledge, the preparation of active, definitely known endocrine drugs by standardizing the collecting of animal matter, the drying, packing, shipping, defatting, etc. Once we know the tools we employ we may soon learn how to use them judiciously to the benefit of the patient and to the advancement of science.

CONCLUSIONS.

Time does not permit me to call attention to the many other problems confronting the endocrinologist, nor to discuss more fully those already mentioned. The work still before us is of enormous magnitude. I trust that active cooperation between the clinician, laboratory worker and other scientists will help to solve some of these problems, and in closing I believe I cannot more fittingly sum up the situation than by quoting Rosser (7) who says: "The study of endocrine function is perhaps at its most perilous stage. So marvellous have been the results of the earnest and scientific work of pioneers in the field that the medical profession is in danger of imitating the attitude now assumed by the general public, accepting any and every oracular dictum concerning the application of internal secretion therapy to practice, demanding only the authority of the printed word, and forthwith making the innocent patient material for research."

REFERENCES.

1. Biedl, Arthur: *Endocrinology,* September, 1921.
2. Cushing, Harvey: *Journal A. M. A., June* 18, 1921.
3. Fads in Medicine and Surgery, *American Journal of Surgery,* November, 1921.
4. Hoskins, R. G.: *Endocrinology,* September, 1921.
5. *Idem: Journal A. M. A.,* November 5, 1921.
6. Barker, L. F.: New York Medical Journal, March 2, 1921.
7. Rosser, C.: *Endocrinology,* September, 1291.

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A Peculiar Form of Pituitary Disturbance

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Diseases of the pituitary gland have generally been grouped as follows:

1. Types of diseases in which the anterior lobe is predominantly affected, or hyperpituitarism. This in turn is subdivided into: a, gigantism, the adolescent or Lanois type of hyperpituitarism, when the process antedates ossification of the epiphyses, and b, acromegaly, the postadolescent or Marie type.

2. Types of diseases in which both the anterior and posterior lobes are affected, or hypopituitarism, which in turn is subdivided into: a, preadolescent adiposogenital dystrophy, when the process originates in childhood—the Froehlich type, and b, postadolescent adiposogenital dystrophy, when originating in the adult type of Cushing.

3. Types of disease in which hyperpituitarism and hypopituitarism occur simultaneously and in successive stages, or dyspituitarism.

In addition to these types Reichmann (1) in 1919 called attention to a new syndrome associated with disease of the pituitary body, the chief symptoms of which are acromegalic features, cyanosis of the face with exophthalmos and dilatation of pupils, cardiac hypertrophy, bradycardia and hypertension, glycosuria, menstrual irregularities and premature menopause, myasthenia, edema of the legs, and diminished number of lymphocytes in the blood. A case similar to those described by Reichmann was recently observed clinically at Bellevue Hospital.

Case.—The patient, a woman aged twenty-one, came to the hospital complaining of severe headaches for the past ten years, marked weakness and anorexia for three years, and marked cyanosis of the face for the past eighteen months. She has also had a peculiar menstrual disturbance. Her first menstrual period appeared at eighteen and was followed by a period of amenorrhea lasting two years. Then a pelvic operation was performed and her menstrual flow returned, but at irregular intervals. Her past history showed that she had measles, whooping cough and diphtheria in childhood. One year ago in an attempt to cure her amenorrhea, she had a right oophorectomy done. The right ovary at operation was found to be quite cystic. She married three years ago and had one child.

The patient was well developed and rather tall. Cyanosis of face and lips was quite marked, while that of the hands and feet was less so. There was slight but definite exophthalmos of both eyes. The pupils were dilated, were equal and regular and reacted well to both light and accommodation. There was neither hemianopsia nor concentric contraction of the visual fields. The fundi were normal. The bones of her face were moderately prominent, and there was definite prognathism of her upper jaw. The teeth were widely spaced. The lungs were clear. The heart was slightly enlarged to the left. A short systolic murmur was heard at the apex. The heart rate was 72; blood pressure 125 systolic; 75 diastolic. There was moderate enlargement of hands and feet. The reflexes were normal and there were no sensory disturbances or equilibratory incoordination.

The urine examination was entirely negative. The phenolphthalein excretion was sixty per cent. in two hours. The blood picture was as follows: Red blood cells, 4,550,000; hemoglobin, seventy-five per cent.; white blood cells, 12,000 with a differential of neutrophiles forty-six per cent.; lymphocytes, forty-six per cent.; transitionals, eight per cent. The blood Wassermann was negative on two occasions. Spectroscopic examination of the blood was negative for methemoglobin. The blood sugar was fifty milligrams to the 100 c. c. of blood. On lumbar puncture the spinal fluid came out under normal pressure. It was clear, contained thirty cells to the c. mm., had a trace of globulin and reduced Fehling's. Radiographs of the skull and extremities showed a slight erosion of the posterior clinoid processes of the sella turcica and upper jaw prognathism, but no changes in the bones of the hands and feet.

The patient stayed in the hospital twenty-seven days and throughout this period her condition remained unchanged, except perhaps for relief from headache for a time following the spinal puncture.

This patient, then, beside the definite hyperpituitary manifestations, had also exophthalmos and dilatation of pupils, cyanosis of face, slight cardiac hypertrophy, myasthenia and menstrual disturbance. The two cases reported by Reichmann presented in addition to the symptoms just enumerated, edema of the legs, high blood pressure and slight glycosuria. One of his patients also had a bradycardia and slight lymphocytic reduction in the blood. Whether the additional findings recorded by the German author are essential to the makeup of this singular type of pituitary disturbance remains to be seen. A definite conclusion as to the essential symptom complex cannot be drawn from the report of only two cases. Then, of course, no clinical entity can be so clear cut as to consist only of a certain fixed group of symptoms and not admit of some variations and omissions. Certainly our patient resembles very closely the examples of pituitary disorder recorded by Reichmann.

As to the pathological findings no definite statement can be made as yet. Reichmann's case that came to necropsy showed an adenoma of the anterior lobe of the pituitary gland, but in addition also had a small thyroid and slight hyperplasia of the adrenals. The possibility of a polyglandular disturbance would thus suggest itself. In his second case the röntgenogram of the skull was suggestive of pituitary enlargement. The same suggestive evidence was obtained by the radiograph in our case. From the evidence thus far at hand one would be inclined to regard this peculiar clinical picture as a distinct though perhaps rare type of pituitary disease.

I wish to express my thanks to Dr. Theodore J. Abbott for permission to report this case.

REFERENCES.

1. Reichmann: *Deut. Arch. f. klin. Med.*, 130, 1919.

Editorial Articles

THE OVUM AS AN INTERNAL SECRETORY ORGAN.

May the ovum be regarded as an internal secretory organ, in much the same way as the thyroid and the pituitary secrete a hormone? There are reasons for attributing this function to the ovum even if it is but temporary. At any rate, as Dr. Louise McIlroy points in her suggestive article in this issue of the JOURNAL, the question is deserving of a certain amount of consideration. It is obvious that the introduction of the ovum upsets the balance between the endocrinous organs. Why does this take place? It is pointed out that the ovum closely resembles in its effect that occurring in menstruation due to ovarian secretion and if the balance between the preexisting organs and this temporary socalled lodger is not maintained the pregnancy is pathological. There is no doubt that the ovum exerts a marked effect upon the maternal organism, and that it secretes a destructive chemical substance has been proved. Dr. McIlroy thinks it is possible that the early symptoms of pregnancy are mainly due to the loss of balance between the internal secretory organs; that as pregnancy advances they gradually regain their normal functions. Toward the end of a pregnancy the balance may again be upset by the stress and strain of the large ovum or by the failure of elimination by the excretory organs and toxemia may result. The article by Dr. McIlroy leads one to wonder whether her suggestion may not be in the right direction. The toxemias of pregnancy have had little investigation. The field is untilled and such investigation should bear good fruit. The results should be of benefit to the pregnant woman, for if the cause or causes are known, effective steps can be taken for their prevention. It is well, therefore, that the functions of the ovum should be closely studied.

RADIOTHERAPY IN BASEDOW'S DISEASE.

Radiotherapy in Basedow's disease has been for some years past a much discussed subject. Many physicians have denied its usefulness, while surgeons have extolled operative treatment, the technic of which has been so greatly perfected. Finally, among radiologists there has been a difference of opinion, some preferring the galvanic current which, while being absolutely harmless in their opinion, gives as good results. There are two reasons for this difference of opinion. On the one hand, it is always the more serious cases which are rebellious to treatment that are subjected to radiotherapy after every conceivable form of treatment, except surgery, has been tried. On the other hand, it is only with a very careful technic and with massive doses of the rays that radiotherapy is successful in this affection.

Radiotherapy is indicated in all types of Basedow's disease, with the exception of simple goitre which has become exophthalmic symptomatically. In these cases, no more than in simple goitre, no change in the condition will be forthcoming and this likewise applies to cystic goitre and neoplasm of the thyroid. With these exceptions the x rays will obtain in exophthalmic goitre an improvement in thirty per cent. of the cases according to Belot, and in ninety per cent. according to Holzknecht. In the milder forms medical treatment with sodium salicylate, and thyroid extract, may be first essayed and when no results are manifested the x rays can be resorted to. In advanced or serious cases, with the general health of the patient profoundly involved, with emaciation, nervous instability, palpitation and extreme emotivity, these disturbances being combined with the four great objective symptoms, namely, tachycardia, tremor, goitre and exophthalmos, it is prudent not to delay but to begin x ray treatment at once. This in no way interferes with internal medication at the same time.

It is in these typical cases presenting the complete Basedow syndrome, that the most brilliant results may be anticipated. In patients presenting incomplete syndromes, in the morbid states related to hypersecretion due to a vitiated thyroid secretion without appreciable swelling of the gland, radiotherapy may be tried, but prudently, and although the treatment may occasionally improve the patient's condition, it also is often unsuccessful. The nervous disturbances and cardiac symptoms are the first to be influenced by treatment. The nervous irritability becomes less, the patient is calmer and sleeps better. These changes may come about very quickly, even during the first month of treatment or occasionally after a temporary exacerbation accompanied by diarrhea and nausea, as Belot and Clunet have pointed out.

The cardiac disturbances are among the first symptoms influenced, the oppression and palpitation decrease and the pulse becomes less frequent, although it usually remains above normal, seldom being less than ninety to eighty beats. At the same time the tremor and nervous excitation decrease. The goitre and exophthalmos are the symptoms least influenced by the x rays; nevertheless, in the more fortunate cases the circumference of the neck decreases, but this usually occurs quite tardily and a long time after amelioration of the functional disturbances has taken place. The exophthalmos, even if it decreases, never completely disappears. Briefly, great improvement may be quickly obtained and there may even be recovery from the functional disturbances, but the objective phenomena are more resistant and disappear tardily and incompletely.

Radiotherapy requires that the thyroid shall absorb large doses of the x rays, but it must not be forgotten that the skin of the neck is sensitive and since the treatment lasts for several months every precaution must be taken to prevent cutaneous reaction. The desired result will be obtained by using hard and greatly filtrated rays and radiating several areas. Belot, unlike Clunet, does not believe it is necessary to reach a dose of ten H units filtered through four millimetres of aluminum. He uses six H units of hard rays filtered through two or three millimetres and repeated every twenty days. Each series comprises two lateral radiations directed on the lateral lobes of the thyroid and its isthmus, as well as on the thymus which, as Dustin has shown, is a gland in full activity in adult subjects.

Clunet drew attention some time ago to the importance of acting on the thymus in cases of Basedow's disease, and since then several observers, especially Waters, have obtained excellent results from systematic radiation of this gland. Belot advises an interval of several days between the three radiations given the first week in order not to reduce the gland too suddenly and also to avoid toxic reactions, vomiting and diarrhea, which occasionally supervene at the beginning of the treatment.

A DEFENCE OF THE THYMUS GLAND.

The thymus gland does not hold the place among its fellows which it rightly deserves, according to Dr. Leonard Williams. In this issue Dr. Williams presents an eloquent defence of an organ which has fallen into unmerited disrepute, or rather has been neglected, not sufficiently studied, and consequently has not been properly understood. Its function is being recognized now better, to some extent, than formerly, and it is known that this gland does not immediately begin to atrophy from birth and to disappear completely in the course of two or three years' time, as was once believed. On the contrary, at the present time the thymus is recognized as an intrathoracic gland, variable in size, which, so far from disappearing in the course of the first two years of life, continues to grow up to the age of puberty, and even beyond in some cases, at which point, though its essential histological structure may undergo atrophy, the noble elements are frequently so replaced by fat and connective tissue that the original bulk of the organ is in nowise decreased; moreover, the atrophy of these noble elements is never so complete as to prevent them from sufficiently proliferating as to restore the gland to its original integrity. Also, and this is an important and interesting point, it is sensitive to cosmic influences. Its size changes with the change of climate, and alters with the alternation of the seasons.

Misconceptions as to the character and age of the thymus naturally have robbed it of any functional value in the estimation of clinicians. A gland which was thought to cease to exist two or three years after birth must be a negligible quantity, so far as its influence on physical or mental health is concerned. But with removal from the undeserved obloquy into which it had fallen, one began to think that so large an organ living to so respectable an age could not have been made a cog in the wheels of the human system if it were not intended to fulfill a definite purpose.

The object of Dr. Williams's paper is to point out the reasons for the existence of the thymus. His suggestion is that the thymus is a sort of male thyroid, that it is possessed of the same miraculous power, though in a degree certainly inferior, of enlarging itself and decreasing, in response to stimuli which seem to us singularly inadequate. Dr. Williams proceeds to describe what he conceives to be the *raison d'etre* of the thymus, or perhaps it will be more correct to say, suggests what its functions may be. For example, thymic enlargement is responsible for status lymphaticus, that is, status lymphaticus could not occur without thymic enlargement. Also, it is one of the causes of asthma which is substantially a disease of the male sex and usually begins about puberty. Further, the best remedies for asthma are those which have a direct action in diminishing the size of the thymus gland. iodide of potassium and adrenalin. It is instructive to notice that among the causes of thymic persistence of hypertrophy Dr. Williams would place the influence of intestinal toxemia. There is not a doubt that Sir Arbuthnot Lane would agree cordially with this view, and it certainly is correct to ascribe to that condition a considerable proportion of the ills to which man is subject.

Again he draws attention to the fact that all infants and children are grossly overfed, a doctrine that Dr. Eric Pritchard preaches in season and out of season, also that adults grossly overfeed themselves. Evidently the author of the article believes in the old saw that a large number of people dig their graves with their teeth. He likewise takes a tilt against the quality of the food generally eaten, the devitalizing of milk and meats by heating, by the cooking of foods and vegetables and he might have added by the large consumption of artificial and prepared foods. Any method, in fact, which deprives our food of the vitamine elements is pernicious. Dr. Williams insists on this truth, that the food elements which protect us against the so-called deficiency diseases will protect us with equal efficiency against the glandular enlargements, of which thymic enlargement is only one. If such a term may be applied to a medical paper, that of Dr. Williams's may be aptly described as fascinating. He has made almost a romance of the thymus gland in his endeavor to rescue it from the depths into which it had dropped. It may be said that he has made out a very strong case and his arguments and suggestions are worthy of close consideration. His final remarks are full of weight although clothed in simple language. He emphasizes the point that our knowledge of the internal secretory organs has progressed vastly during recent years. We are now a little way over the threshold, although we have yet far to go ere we reach the inmost chamber. It is well to feel, however, that we are advancing. Dr. Williams has assuredly shown that the potentialities of the thymus gland are great and has placed it within the sacred circle.

THE PREVENTION OF CRIME.

James A. Hamilton, Commissioner of Correction of New York, has made a study of the prevention of crime and has formulated the following valuable rules which are instructive.

Crime we know to be a real social or economic malady, and while we do not believe that medicine, surgery, or psychiatry play the only rôle in the rehabilitation of the criminal, much can be learned from the medical men in their treatment of physical and mental disease, and it can be made applicable to the handling of the entire subject of criminality.

Crime will never be eradicated by the apprehension and punishment of the criminal, nor should we be satisfied with the reformation of particular cases, no matter how many nor how gratifying the results have been from the proper institutionalization of certain types. This is only scratching the surface and while it has its place in the general scheme, the real work to which we should devote our best efforts is the prevention of crime.

In our treatment of criminality we have in some instances paralleled the lines of action which have been laid down by our medical friends. They have established hospitals for the care of those acutely sick, while we have our modern penal institutions. Their dispensaries for posthospital care might be likened to our parole scheme; but in their grand efforts in that department where the greatest work has been accomplished, the prevention of disease, we have no analogy. No real serious effort has been made to combine all our forces for a drive for the prevention of crime. What work has been done, has been through individual agencies working along their own lines. What we need is a combined effort guided by a thoroughly scientific investigation of the subject. The keynote of our efforts should be "the prevention of crime." The study of criminology must necessarily start with the investigation of what makes good character, as we realize that crime and criminal instinct gain the ascendancy in an individual as he loses one or more of the attributes of good character.

It is a well known truth that a boy's character in almost every instance is already formed by the time he reaches the age of eighteen years, and a girl matures at a much earlier age. How necessary then it is for us to study children if we wish to observe crime and criminal tendencies in their incipiency. This work is being attempted in New York city by the medical board connected with the Children's Court. Their efforts, however, are handicapped for lack of space and lack of sufficient detention wards where these children may be observed without interference from outside sources. Facilities should be provided for the intensive study of children which would not only include these cases which come before the court, but a class, the majority of whom would be referred by physicians and social workers for mental and psychometric tests. This would be a real step forward in the prevention of crime.

Those who are familiar with the work that is being carried on in our clinics, with reference to children, will appreciate the necessity of hospital wards devoted exclusively to the mental care of children. All pediatrists find innumerable cases of birth injuries which result in different degrees of mental deficiency. Physicians realize that many of these children will be unable to cope with society, and will resort later on to criminal methods to obtain their livelihood. Other children through faulty functioning of some of their organs become emotionally unstable, and during attacks of what we used to think was mere temper or hysteria commit crimes that could have been prevented were these children receiving proper treatment in an institution where their condition would be thoroughly understood. Let us, therefore, establish wards where children may be detained during the completion of certain tests to determine the proper functioning of their organs.

PHYSICIAN-AUTHORS: GARTH AND BLACKMORE.

That doctors disagree is proverbial. Their disagreements are popularly supposed to pertain only to medicine, but in the days when Sir Samuel Garth and Sir Richard Blackmore practised in London, these two knighted physicians disagreed not only as to the medical ability of each other, but also as to their literary ability, being competitors in poetry as well as in pills. When Blackmore in his *Satyre Against Wit* (1700) assailed Garth and other wits of the time on the score of grossness and irreligion, he brought down upon himself a veritable torrent of lampoons and ridicule. They united against him to a man—Pope, Dryden, Steele, Garth and all the rest, and thus, as Saintsbury says, Blackmore became one of the small and curious company who have been made immortal by their satirists. Did they confine themselves to criticism of Blackmore's literary efforts? Not at all. They exhibited the same venomous prejudices that nettled humans generally exhibit on such occasions and took ironical digs at his medical ability, too. What Sir Samuel Garth wrote is a fair sample:

Unwieldy pedant, let thy awkward muse
With censures praise, with flatteries abuse;
To lash, and not be felt, in thee's an art,
Thou ne'er mad'st any but thy schoolboys smart.
Then be advised, and scribble not again—
Thou'rt fashioned for a flail and not a pen.
If B——l's immortal wit thou would'st decry,
Pretend 'tis he that wrote thy poetry.
Thy feeble satire ne'er can do him wrong;
Thy poems and thy patients live not long.

But as a matter of fact, Blackmore was a first rate physician, educated at Padua in the days when Padua afforded the best medical training of any university in Europe, which alone is assurance of his high skill in physic. He ranked high, also, in the College of Physicians, of which he became a fellow in 1687, serving as censor, lecturer and in other capacities. "Being despised as a poet," says Samuel Johnson, "Blackmore was in time neglected as a physician; his practice, which was once invidiously great, forsook him in the latter part of his life; but being by nature, or by principle, averse to idleness, he employed his unwelcome leisure in writing books on physic and teaching others to cure those whom he could himself cure no longer. I know not whether I can enumerate all the treatises by which he has endeavored to diffuse the art of healing; for there is scarcely any distemper of dreadful name which he has not taught his readers how to oppose."

He practised in London from 1687 to 1722, was physician in ordinary to King William III for many years and was knighted by him. And all through this period, and up to his death, at Boxted, Sussex, in 1729, he was an indefatigable writer. His large output of medical treatises were written during the latter part of his life, together with an equally large number of treatises on theological and miscellaneous subjects. In his earlier days he wrote six epics in sixty or more books, all on the loftiest themes, beside versions of several books of the *Bible* and other writings. His *Prince Arthur* was in ten books, his *King Arthur* in twelve. *King Alfred* (in twelve books), *Eliza,* (in ten), *The Creation* (in ten books) were some of his other titles. With the exception of his *Prince Arthur,* which reached three editions in two years, none of his writings was very popular even in his own day, and in this day they are absolutely unread. Cowper neatly appraises his work when he says, "the pious knight has committed more absurdities in verse than any writer of our country." Blackmore was born in Garsham, Wiltshire, in 1650, and prior to going to Padua, was educated at Westminster and Oxford. At first he was a schoolmaster—in what the wits of the day called "the whipping trade"— a fact with which his enemies frequently taunted him in later years.

In vain his drugs as well as birch he tried,
His boys grew blockheads and his patients died.

Garth was an entirely different type of man, a jovial Yorkshireman, who had none of Blackmore's longfaced piety. He was a mixer, whereas his contemporary was a humorless recluse. All those who had ridiculed Blackmore showered praise on Garth, who was as popular as Blackmore was unpopular. Sir Richard Steele dedicated *The Lover* to him, calling him "the best natured man." Dryden said, "Garth is as generous as his muse," and Pope also paid a fine tribute to him. Another of his contemporaries called him "the most agreeable companion I ever knew." He was, if we are to believe all of his contemporaries but Blackmore, one of the wittiest fellows of his day, without a spark of selfishness or rancour. In medical ability he was the equal of Blackmore, though perhaps not any better. Garth obtained his medical degree at Cambridge on July 7, 1691, but he also studied at Leyden, which was the greatest rival Padua had in those days and even excelled Padua in some respects. Garth became a fellow of the College of Physicians on June 26, 1693, and in the following year was Gulstonian lecturer. He also was the Harvey orator in 1697 and the censor beginning in October, 1702. Like his rival, he also was physician in ordinary to the king and in addition was physician general to the army up to the time of his death in London, on January 18, 1719. Whatever their respective merits as medical men, unquestionably Garth was the more successful of the two, from a materialistic viewpoint, at least. His practice was very large and he left an ample fortune, which, however, was partly due to the proceeds from the sale of his books.

We hear much about logrolling these days. Perhaps Garth's literary popularity was to some extent due to the logrollers of his day. His *Dispensary*, once a famous mock heroic poem, published in 1699, ran into three editions in that year and by 1741 it was in its fourteenth edition. It continued to be generally read for another fifty years and some of its phrases are still quoted. But, as Edmund Gosse points out, the fun has all faded out of it and it is no longer in the least degree attractive. The subject of *Dispensary* is a quarrel between the physicians and apothecaries in London, a humorous record of the first attempt to establish those out patient rooms now universal in the large towns of England. "No passages fall below mediocrity," said Samuel Johnson, "and few rise much above it." Besides the *Dispensary*, Garth wrote *Claremont* (1715) and did a good deal of translating, of the orations of Demosthenes (1702), Ovid's *Metamorphoses*, and various other Greek and Latin works.

SCHOOL LUNCHES.

The agitation for improved nutrition of children has been none too active, for nothing is so much needed to produce healthier, sturdier humanity. As yet we have only scratched the surface of the problem. We need to go farther back, to prenatal as well as postnatal feeding. The human body, once built, cannot be reconstructed to any considerable extent.

Habits are strong, especially when backed by the need for a livelihood, and it is interesting to note the pains to which some dietitians go in arranging programs for school lunches. There must be half a dozen or so items on the bill of fare, and some of these concocted of yet another half dozen ingredients, and "down in the bottom of the lunch box," to quote a writer in one of our household journals, "there should be a surprise in the shape of some fine bit of candy or of pastry which will tempt the appetite of the child." Of course the child will know, or will soon find out, that this tempting morsel is somewhere in the box and will search for it first. Of course, also, after eating the delicate tidbit there will be lessened appetite for other more profitable provender. And all this recommended practice, followed a serious article on the subject of calories, minerals, vitamines and the other terms with which nutritional experts try to conjure (alas, with poor success) for the improvement of human tissue and making available more abundant energy.

It devolves upon the medical profession to preach simpler and saner dietetics if we are to get anywhere along development of the fundamentals of physical training, for, aside from heredity, the feeding of a few simple, and not overrefined, foods to prospective mothers, to infants and growing children is fundamental. Food is the source of growth, of repair and of energy, and the machinery of physical training which now goes by that name would be unnecessary if the source of energy was normal. A well fed child does not need to learn to play or to stand erect. It cannot help doing both, if it has half a chance. Moreover, it will need no confectioner's concoction to tempt its appetite.

It is to be hoped that schools for dietitians will make it their business to turn out pupils who will exhibit common sense along their chosen line of work and who will develop into the most important physical trainers of the future.

News Items.

Congress of American Physicians and Surgeons.—This congress will meet in Washington, D. C., on May 2d and 3d under the presidency of Dr. Frank Billings, of Chicago.

International Otological Congress.—The tenth International Otological Congress will be held in Paris, July 19 to 22, 1922, under the presidency of Professor Pierre Sebileau. Dr. A. Hautant, 28 rue Marbeuf, Paris, is secretary general, and Dr. Thomas J. Harris, 104 East Fortieth Street, New York, is secretary of the American Continuation Committee.

New York Electrotherapeutic Society.—At the annual meeting held on March 1, 1922, Dr. Victor Cox Pedersen was elected president and other officers were elected as follows: Dr. Harry Eaton Stewart, first vice-president; Dr. Sinclair Tousey, second vice-president; Dr. J. Willard Travell, treasurer; Dr. Richard Kovacks, secretary; Dr. Frederick de Kraft, Dr. A. B. Hirsh, Dr. Byron S. Price and Dr. William Benham Snow, members of the executive committee.

Hospital Information Bureau.—Dr. E. H. Lewinski-Corwin, executive secretary of the Public Health Committee of the New York Academy of Medicine, has been appointed director of the Hospital Information Bureau recently established in the New York Academy of Medicine Annex, 17 West Forty-third Street. The purpose of the bureau is to keep in touch with hospital work and progress in New York, to furnish information to all interested in administration, record keeping and other facts of hospital work, organization and facilities; to study and make known the hospital needs of the city, to prepare exhibits, to maintain a library of hospital reports and to promote uniformity in hospital reporting.

Bureau for Part Time Work.—This bureau has been established for the purpose of obtaining part time positions for trained women workers. Applicants will be registered as physicians, secretaries, clinical assistants, dental assistants, stenographers, translators, social service workers, etc. An office has been opened at 105 West Fortieth Street. Miss Eleanor H. Adler is executive secretary.

Class Reunion.—The Class of 1892 of the Medical Department of the University of the City of New York, held an informal reunion and banquet at the Hotel Commodore, on Wednesday evening, March 29, 1922. The committee in charge included Dr. Robert Emmet Coughlin, president; Dr. John F. Hagerty, secretary; Dr. J. Emmet Tower, Dr. William Meddaugh Dunning, and Dr. Frederick C. Holden.

Health Talks by Wireless.—Through the courtesy of the General Electric Company, five-minute health talks prepared by the New York State Department of Health will be broadcasted twice each week from Radio Station W.G.Y. (Schenectady). The first talk was given Friday evening, March 24, at 7:40 p. m. These health messages can be heard by any one possessing a suitable wireless telephone receiving set.

Harvey Lecture.—Dr. Raymond Pearl, professor of biometry and vital statistics, Johns Hopkins School of Hygiene and Public Health, will deliver the ninth Harvey Society Lecture at the New York Academy of Medicine, Saturday evening, April 8, 1922. His subject will be The Interrelations of the Biometric and Experimental Methods of Acquiring Knowledge; with Special Reference to the Problem of the Duration of Life.

Venereal Disease Clinics Need Assistants.—The Section in Venereal Diseases of the Associated Out Patient Clinics of New York, has offered to act as a clearing house for information regarding opportunities for dispensary assistants in the venereal clinics in New York. Dr. A. N. Thomson, 15 West Forty-third Street, is secretary of the section, and any physician who desires to take advantage of this opportunity to receive special training in venereal diseases should communicate with him.

Public Health Conference.—Under the auspices of the United States Public Health Service a conference was held in Washington, D. C., on March 14th and 15th, of deans of medical schools and schools of public health, presidents of universities, professors of public health subjects and men actively engaged in public health work. After considering the present status of the public health movement and present facilities for the education of health officers and other sanitarians, the conference discussed the various newer aspects of public health and their importance in the training of sanitarians; the various kinds of sanitarians which will be needed for the future; the recruiting and training of more and better sanitarians; and the various problems connected with the training of sanitarians for the future and the further education of those who are now employed in public health work.

Married.—In New York, on Thursday, March 23, 1922, Dr. Abraham Strachstein and Miss Harriet Wolf.

American Pediatric Society.—The thirty-fourth annual meeting of this society will be held in Washington, D. C., May 1st, 2d and 3d, under the presidency of Dr. Maynard Ladd, of Boston.

American Proctological Society.—The twenty-third annual meeting of this society will be held in St. Louis, Mo., May 22d and 23d, under the presidency of Dr. Granville S. Hanes, of Louisville, Ky. Headquarters and meeting place will be at the Hotel Claridge.

Fox Hills Hospital Closed.—At a conference held on March 7th by Colonel Forbes, director of the United States Veterans Bureau, physicians of the bureau and of the Public Health Service, it was decided to abandon Fox Hills Hospital immediately and transfer the 850 patients to other institutions in and around New York.

Medical Society of the Missouri Valley.—The annual meeting of this association will be held in St. Joseph, under the presidency of Dr. Paul E. Gardner, on September 21st and 22d. The committee of arrangement is composed of the following members: Dr. Floyd H. Spencer, chairman; Dr. H. W. Carle, Dr. Frank Hartigan, Dr. J. I. Byrne, Dr. H. S. Conrad, Dr. O. C. Gebhart, secretary. Dr. Charles Wood Fassett, 115 East Thirty-first Street, Kansas City, Mo., is secretary of the society.

Kings County Medical Society Holds Weekly Meetings.—The plan inaugurated on March 1st by the Kings County Medical Society to hold weekly meetings on Friday afternoons at five o'clock through the months of March, April and May, is meeting with great favor. Dr. John Osborn Polak was the speaker at the first meeting on March 3d and his subject was Pelvic Inflammation. It was illustrated with a series of forty slides. Other topics discussed during March were Infections of the Hand, by Dr. William Francis Campbell; The Interpretation of Abdominal Pain, by Dr. George D. Stewart; Cardiac Murmurs and Arrhythmias, by Dr. Glentworth R. Butler, and Infant Feeding, by Dr. Roger H. Dennett.

Western Electrotherapeutic Association.—The fourth annual meeting of this organization will be held in Kansas City on April 20th and 21st, under the presidency of Dr. Curran Pope, of Louisville. The program is now being made up, and will be fully up to the standard of previous meetings. Among those who will read papers are Dr. James T. Case, Battle Creek; Dr. A. J. Pacini, Washington; Dr. T. Howard Plank, Chicago; Dr. William L. Clark, Philadelphia; Dr. Harry Bowing, Mayo Clinic; Dr. A. D. Willmoth, Louisville, and Dr. J. D. Gibson, Denver. Dr. Virgil C. Kinney, of New York, president of the American Electrotherapeutic Association, and Surgeon General Cumming, of the United States Public Health Service, have given a partial promise to be present. Dr. Charles Wood Fassett, of Kansas City, is secretary, and will be glad to furnish additional information regarding the meeting.

Prophylactic Value of Pneumonia Vaccines.—The public health committee of the New York Academy of Medicine issued a report on March 8th in which they state that the experiments of prophylactic inoculation against pneumonia carried out during the period of the war and subsequently have thus far not yielded sufficiently convincing proof of its efficacy to warrant universal application. The experiments, however, have established that the vaccines have some value against three of the fixed bacteriological types of lobar pneumonia; that the duration of immunity secured is probably not over five to six months; that the vaccinations do no harm and there have been no fatal or serious results from them; that the inoculation, in order to be complete, has to be given in three doses. In some cases a rather unpleasant reaction develops and about five per cent. of the subjects feel ill for a time. Experiments are being made with some success, with indications of still greater success in the future, rendering the vaccines less constitutionally disturbing without being less efficacious; that there is a definite indication for the use of vaccines against pneumonia in persons particularly exposed or coming in continuous contact with pneumonia; that every effort should be continued to prevent the spread of respiratory diseases through expectoration, coughing and sneezing. Unfortunately at the present time the regulations are difficult to enforce and are not generally observed. Under the circumstances and until such time as the rules against spitting and unprotected coughing and sneezing are universally followed, the most promising means of preventing acute respiratory diseases lies in the prophylactic vaccine inoculation; that inasmuch as the prevention of pneumonia by inoculation is still in an experimental stage and inasmuch as there are many preparations put on the market which are of doubtful value, the promiscuous use of vaccines should not be encouraged.

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Died.

Agnew.—In Carbondale, Ill., on Friday, March 10th, Dr. Frank M. Agnew, of Makanda, Ill., aged eighty-one years.

Browne.—In Baltimore, Md., on Friday, March 10th, Dr. Bennet B. Browne, aged seventy-nine years.

Chambers.—In New York, on Sunday, March 26th, Dr. Porter Flewellen Chambers, aged sixty-eight years.

Craig.—In Kings Park, L. I., on Tuesday, March 21st, Dr. Anna Craig, aged sixty-six years.

Davis.—On board S. S. *Pan-American*, on Sunday, March 12th, Dr. L. H. Davis, of Millerton, N. Y.

Enger.—In Brooklyn, N. Y., on Wednesday, March 22nd, Dr. Anton Enger, aged fifty-five years.

Hancock.—In Chicago, Ill., on Sunday, March 12th, Dr. Joseph Lane Hancock, aged fifty-eight years.

Hart.—In New York, on Sunday, March 19th, Dr. Henry A. Hart, aged eighty years.

Patterson.—In Newark, N. J., on Tuesday, March 21st, Dr. William Palmer Patterson.

Rapp.—In Atlantic City, N. J., on Saturday, March 18th, Dr. Samuel Rapp, of New York, aged sixty-seven years.

Schultze.—In New York, on Thursday, March 23rd, Dr. Louis W. Schultze, aged sixty-seven years.

Sweet.—In Springfield, Mass., on Friday, March 17th, Dr. Clara M. Sweet, aged sixty-two years.

Willis.—In Huntington, L. I., on Wednesday, March 15th, Dr. Charles Barber Willis, aged ninety years.

Willets.—In Northfield, N. J., on Saturday, March 25th, Dr. David Gifford Willets, aged forty-nine years.

Foreign Correspondence.

VIENNA, *February 3, 1922.*

Medical Vienna is an important component part of the academic city. The university is the pride of its citizens. To them "life is short but art is long" so they submit to curtailed rations with philosophy and even cheerfulness, rather than relinquish their Gobelins to lighten their burdens. And while fortunes shrink, owing to the depreciated currency, nothing can threaten the permanency of the university! A successful merchant or banker is envied in Vienna, as elsewhere, but a *universitäts professor* or even a *docent* commands the profound respect that calls for fitting obeisance from all native Viennese. There is, however, a sad note in all of this, for while their pride is unshaken, those who think clearly cannot fail to appreciate what the rest of the world can observe, that the university is not today what it formerly was. There still exists evidence of scientific supremacy, and, on the whole, a high standard is maintained. It is hoped that in the future as in the past students and untrained physicians from different parts of the world may be able to enjoy the advantages of the teaching and fruits of scientific research, without too great demand upon their limited resources.

The names that have contributed to the medical greatness of the Austrian capital are known throughout the world: Bilroth, Kaposi, Politzer, Zukerkandl, Wagner, von Pirquet, Steinach. Of these some have passed away; one, von Pirquet, is a recent visitor to the United States, and two are at present making medical history—one, Wagner, through his modern contributions to the therapy of neurosyphilis, and the other, Steinach, for his investigations into the causes of retrograde metamorphosis accompanying advanced age in animals and humans, with the possibility of abating this inevitable epoch by what is termed *verjüngung.*

* * *

The foreign postgraduate medical student is afforded extensive opportunities for intensive study in any branch of medicine he may elect. For the Americans there is established a bureau at a table in a characteristic native café, where a bulletin board affords information as to the clinics given by the professors and of the *docents* who hold classes for special instruction. This organization is known as the "A. M. A. of Vienna" and its bureau is presided over by an obliging young woman secretary, a native Viennese, who speaks English. Various other opportunities are afforded those who seek them, in private sanitariums, where there are operations to be seen and outpatient clinics to be attended.

Of the latter, we were invited through the courtesy of Dr. Victor Blum, a urologist of international reputation, to visit the Sophienspital, and here witnessed nephrectomy for tuberculosis; vesiculectomy for the same disease in another case, and various ambulant cases. Prostatectomy is performed here almost exclusively under infiltration local anesthesia.

In the department of Professor Wagner v. Jauregg, we were shown cases during and after treatment for syphilitic (paretic) dementia by the therapy which bears his name and involves inoculations with typhus vaccine, tuberculin and malarial blood serum. The results in these cases are such as to foster hope for a promising era in the treatment of this heretofore practically hopeless stage of the disease.

Our interest was aroused by a visit to Professor Steinach. His work is attracting worldwide attention of a somewhat sensational character. We found him to be modest and serious in his manner, with a reputation for undoubted and unqualified scientific attainment. There is always wont to be a difference of opinion as to the claims that are made, but there is a sufficient number of colleagues of equally scientific mind and purpose, on both sides of the fence, to justify at least an open mind.

In reviewing the greatness of the academic study and research in the Vienna medical world, it would seem that if such an Utopian attainment as that of *verjüngung* were to be realized, its birthplace would naturally be in the university city of Vienna.

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Dr. Tandler, chief sanitary officer of Vienna, has inaugurated a new plan of eugenic education. It is impossible to prevent people having children merely by imposing conditions of marriage, he contends, any more than it is possible to make people pay taxes they are determined to dodge. The thing necessary is to cultivate a sense of responsibility in the individual, he says. Therefore he proposes to give the people the opportunity of consulting voluntarily a municipal consultant on wedlock and will pick for the job a man with a sound knowledge of human nature over and above his medical qualifications. It will be this man's duty to tell the people the truth about themselves and the prospects of their children if they marry, and then let their consciences be their guide. The aim of all this, Dr. Tandler explains, is to educate public opinion to the point where prenuptial consultation will be as much a matter of common sense as is vaccination of babies at birth.

BERLIN, *January 23, 1922.*

Upon entering the German city one is conscious at once of the fair and courteous treatment meted out to the English speaking tourist. Prices are low, despite the abnormal rate of exchange, and there is a striking absence of haggling for higher revenue and no mulcting. In the supply houses, while there are no striking novelties, the surgical instruments are of the finest material and most careful workmanship, at prices that make it well worth while to replenish or amplify one's armamentarium. The electrosurgical and electroscopic apparatus are, as ever, the standards of manufacture, and at prices—well, at such prices that the American instrument importer does not share the advantage of with the American customer.

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The public and private clinics are in full swing. Of course we visited the Charité, that enormous hospital for the people, which houses every department of medicine and surgery, each one like an individual hospital in itself.

The first day we attended the clinic of Professor Hildebrand, and witnessed the removal of a small stone from the pelvis of the kidney (posterior pyelotomy), and an operation for struma (goitre), under very effectual local anesthesia, and other miscellaneous cases. The operations observed were, in general, well performed and precise. The technic, however, is not superior to that of the American surgeon. The skill is there—the speed is lacking, by which is not meant careless speed, but manual dexterity. There are also lacking certain essentials to operating-room routine—namely, rubber gloves, caps and mouth shields.

In one of the clinics I chanced to meet an American doctor, who had taken courses in New York and Chicago, and who made the remark "that he had found nothing in Berlin to equal what he had obtained in New York." This is, of course, a matter of individual judgment.

The next clinic visited was that of Professor O. Ringleb, Department of Urology. Here was to be seen the usual run of out patients, upon whom were made demonstrations for the benefit of students. Removal of a vesical papilloma by transurethral operation was performed by the agency of Ringleb's operating cystoscope, which accomplished the desired object by means of snare. The tumor was removed entirely from its base, but there was no cauterization of the latter, and no radium was used before or after operation, nor was there any particular enthusiasm in behalf of the latter agency.

Later I called upon Professor Leopold Caspar, who is recognized in our country as a urologist of international fame, and presented to him a copy of his textbook. In reading the name of Sir Henry Thompson in the preface thereof, Caspar's eyes shone, and he remarked: "My teacher!" while the name of the noted French authority, Felix Guyon, was passed by without comment.

Upon Professor Caspar's invitation I made rounds with him at his private clinic in the Bismarck Sanitarium. Here we saw a postoperative nephrolithotomy, the notable feature of which was a very wide Koenig incision. The patient was convalescing favorably. Especially interesting was a case of fungating vesical papilloma of rapid recurrence, revealing extensive growth outside of the bladder suprapubically. Eighteen months previously the first operation was performed, and was that already described (Ringleb technic). A second operation one year ago, on account of recurrence, was followed by the last operation five weeks ago, and the present extensive recurrence, covering almost the entire vesical wall, had developed since then. Here, again, was a notable absence of radium treatment.

Another noteworthy case was a prolapsus of both ureters, wonderfully demonstrated through Caspar's own cystoscope. According to the history, a colon bacillus bacteriurea had disappeared under treatment with lavage of the kidney pelves. The prolapsus on both sides was treated with circular cauterization by means of the high frequency current.

The cordial hospitality extended in the Berlin clinics naturally led to an invitation to visit America to see our work, but the candid response was most convincing that such a journey was made impossible by the present conditions of exchange.

CHARLES H. CHETWOOD, M. D., LL. D., F. A. C. S.

Book Reviews

DISEASES OF THE EYE.

Diseases of the Eye. A Handbook of Ophthalmic Practice for Students and Practitioners. By GEORGE E. DE SCHWEINITZ, M. D., LL. D., Professor of Ophthalmology in the University of Pennsylvania; Ophthalmic Surgeon to the University Hospital; Consulting Ophthalmic Surgeon to the Philadelphia General Hospital and the Orthopedic Hospital and Infirmary of Nervous Diseases. Ninth Edition, Reset, with Four Hundred and Fifteen Illustrations and Seven Colored Plates Philadelphia and London: W. B. Saunders Company, 1921. Pp. 832.

Of de Schweinitz's book we may say in the famous stereotype of the toastmaster, that it needs no introduction. The work has been standard as a guide and authority since its first edition. The ninth edition and revision merely emphasize the fact that here the expected has happened, and that the latest issue is, if possible, more admirable than those preceding. The experiences of the author and of other ophthalmologists in the Great War is embodied in new chapters on military eye surgery, gas conjunctivitis, contusions of the globe, and methods of blepharoplasty, while the subjects revised or newly considered, ranging from ophthalmoscopy with red free light to estimation of accommodation by skiascopy, would require for their mere enumeration, more space than is allotted to this critique. The continued cordial reception which has, in the modest appreciation of the author's preface, "thus far been accorded to this book," is well deserved and will continue.

ANATOMY OF THE NERVOUS SYSTEM.

Die vergleichende Anatomie des Nervensystems der Wirbelthiere und des Menschen. I Abschnitt. Von Dr. C. U. ARIËNS KAPPERS, Direktor des holländ Zentral Institutes Hirnforschung, Amsterdam. Haarlem: De Erven F. Bohn, 1921.

This book fills a long felt want in neurological science. The structure of the nervous system has been investigated by students for the past fifty years and their findings recorded. Occasionally a particular organ of the nervous system, such as the hypophysis or the cerebellum, has been the subject of more thorough morphological research and the findings recorded in monographs of recognized value, but a broad, comprehensive treatment of the general phyletic organization of the nervous system has been lacking and this is contained in Kappers's book, the first portion of which is devoted to the invertebrates. The most general capacity of the animal body is that of an energy transmitter and its conduct is determined by stimuli received through special receptor organs. The pathways by which these stimuli are organized for effector purposes are traced in the most scientific manner. Kappers seems to have struck a happy balance between a hasty generalized impressionism and a mountain of detailed and precise records which would need a lifetime to master. The essential facts are presented for the use of the clinician and the anatomist.

The first fifty pages are devoted to the general morphology of nerve elements and in the next thirty are outlined the general laws of connection of the neurons, the development of synapses and some fundamental concepts of reaction to stimuli and their consequent structural results. These Kappers has formulated under his law of neurobiotaxis, a valuable generalization in the study of the development of nerve organs.

The second chapter deals with comparative anatomy of the spinal cord, and illustrations are numerous and instructive. In a third chapter the branchial system, the nerves of taste, the trigeminus and the components of the medulla are considered, and in the fourth a similar discussion of the eighth nerve components and the lateral line system of lower vertebrates is given. The effector systems of the medulla and midbrain are discussed in the fifth chapter, while in the sixth and last the coordinating pathway and synaptic junction systems between the medulla and the midbrain are taken up. In this chapter the coordinating work of the olivary bodies is treated at great length. Each chapter has an extensive bibliography.

The book is a masterpiece, not only evidencing the author's comprehensive grasp of many intricate problems but is also a delightful exposition. We believe that it should be studied by every worker in the neuropsychiatric field of medicine who aspires to be well grounded in the structure of the nervous system.

INFLUENZA AND ITS PULMONARY COMPLICATIONS.

Studies in Influenza and Its Pulmonary Complications. By D. BARTY KING, Physician to the Royal Chest Hospital, London. New York: Paul B. Hoeber, 1922. Pp. 88.

Influenza has been studied uphill and down and across lots. Here are three studies of, a, an outbreak of influenza among one hundred and fifty cases of malaria; b, after effects of acute pulmonary complications of influenza, and c, the epidemic as it affected the nursing staff of the County of London War Hospital. None of these chapters present anything striking in regard to the disease, though the first is of value to clinicians residing in malarial districts. As is to be expected, the effect of quinine is an excellent diagnostic test for distinguishing between the onset of malaria and that of influenza. In the treatment of influenzal cases, the author is very alert to bring about complete recovery of diseased lung tissues.

PUBLIC HEALTH ACTIVITIES.

Annual Report of the Surgeon General of the Public Health Service of the United States, 1921. Washington: Government Printing Office, 1921. Pp. 400.

The work of the United States Public Health Service covers a wide field—the sun never sets on its activities and their nature is various. It is busy in research investigations into the causes and conditions for epidemic diseases; the conditions disastrous to health in industries. It is interested in venereal disease and in child hygiene. It supervises the production of viruses, serums, etc. It assists various local agencies in health work. All this besides looking after foreign and domestic quarantine, marine hospitals, and soldier relief work. All this is sketched briefly in this report.

VENOMS AND VENOMOUS ANIMALS.

Animaux venimeux et venins. La fonction venimeuse chez tous les animaux; les appareils venimeux, les venins et leurs proprietes; les fonctions et usages des venins; l'envenimation et son traitement. Par Marie Phisalix, agrégée de l'ensiegnement secondaire des jeunes filles, docteur en medecine de la Faculté de Paris. Tome I: 521 figures dans le texte, 9 planches en noir, 8 planches en couleur hors-texte. Pp. xv-656. Tome II:Pp.xii-864. Paris: Masson et Cie, 1922.

These two volumes deal with all manner of poisonous and venomous animals. From the lowest protozoa injurious to man to the venomous serpents, there are described the mechanisms, the forms of intoxication, and the action of the poison. The text has been written with clarity and detail and the illustrations are beautifully done. Workers in this special field will find the topic completely and satisfactorily covered. Students of tropical medicine will also find these volumes indispensable.

HISTORICAL MEDICINE.

An Introduction to the History of Medicine. With Medical Chronology, Suggestions for Study and Bibliographic Data. By Fielding H. Garrison, A. B., M. D., Lieutenant Colonel, Medical Corps, U. S. Army, Surgeon General's Office, Washington, D. C. Third Edition, Revised and Enlarged. Philadelphia and London: W. B. Saunders Company, 1921. Pp. 942.

The third edition of Garrison's most valuable *History of Medicine* should find favor among medical men who are interested in the accomplishments of the pathfinders of scientific medical achievement. Much material which is the result of other workers in the field of historical medicine has been added, as well as some of the outstanding medical history of the late war. As the book stands it is one of the most complete and readable medical histories we have today. We may well be proud of a work of this monumental character having been done in America.

PSYCHOANALYSIS.

The Logic of the Unconscious Mind. By M. K. Bradby. London: Henry Frowde, Hodder & Stoughton (Oxford University Press), 1920. Pp. xiv-316.

Psychoanalysis and Its Place in Life. By M. K. Bradby. Second Impression. London: Henry Frowde, Hodder & Stoughton, Ltd. New York: Oxford University Press, 1920. Pp. xi-266.

It is difficult properly to place these two books of Miss Bradby's in psychoanalytical literature. Those versed in psychoanalysis will find little new in them and a great deal that is sketchy and vague. Her treatment of psychoanalysis is jumpy for she skips about in an incoordinated fashion as though overenthused by the wealth of material she has discovered. The book is overloaded and underdirected. If one has patience, it will be rewarded by many interesting observations, biased by personal problems, yet earnestly set forth. It is as though someone was trying to convince the reader by gesticulating with hands, feet, tongue, and every available anatomical member of the body. Scores of books are quoted and hurled at the reader as if "not believing me perhaps these better known authors will convince you."

The volume in which Miss Bradby seems to be more at home is the one dealing with philosophy and psychoanalysis. She feels that if psychoanalysis has to date made no effort to link itself with any philosophical system it is high time it did. This task she proposes to fulfill. The effort is a worthy one but a bit premature as attested by the contents of her book. It is nice of her to attempt to drive her ideas home by means of homely illustrations which she no doubt feels we can all of us better understand, yet some of us know less of breadbaking than of many other things more or less complex.

It seems that with Miss Bradby's broad literary background and her work in psychoanalysis she should write more fundamental books. Perhaps if she were to keep her personal bias (whether for good or otherwise) aside she would better succeed.

TREATMENT.

An Index of Treatment. By Various Authors. Edited by Robert Hutchison, M. D., F. R. C. P., Physician to the London Hospital, and James Sherren, C. B. E., F. R. C. S., Surgeon to the London Hospital. Revised to Conform with American Usage by Warren Coleman, M. D., Assistant Professor of Medicine, University and Bellevue Hospital Medical College. Eighth Edition, Revised and Enlarged. New York: William Wood & Co., 1922. Pp. xviii-1029.

It is gratifying to find a standard textbook of treatment keeping pace with the most modern modes of therapy. The various diseases and treatments are briefly described, yet the instructions are precise and not misleading in any way. The practitioner or even the specialist should have a book of this type for reference and suggestion. The book, while of English origin, conforms with American usages and covers the ground completely.

PALEOPATHOLOGY.

Studies in the Paleopathology of Egypt. By Sir Marc Armand-Ruffer, Kt., C. M. G., M. D. Edited by Roy L. Moodie, Ph. D. Chicago: University of Chicago Press, 1921. Pp. 366.

The descriptions of the examinations of specimens are similar to those of the hospital autopsy reports of the present day. The lesions are essentially those found in pathological conditions met with in every hospital clinic. Yet the studies are of interest for comparative paleopathology and paleoanatomy will eventually shed light on topics of medical interest. The present volume represents painstaking work of a high order. It is a clean cut, dignified report, well illustrated and making no elaborate pretensions. It is a book of more than ordinary interest.

FOLK RHYMES OF THE AMERICAN NEGRO.

Negro Folk Rhymes, Wise and Otherwise. With a Study by Thomas W. Talley, of Fisk University. New York: The MacMillan Company, 1922. Pp. xii-347.

We are greatly indebted to Talley for his contribution to folk literature. This book of carefully selected verse should be of great value in the future. The study of the folk literature of the American negro has long been neglected. Many gems of rare beauty are presented in this collection of near primitive folk verse.

MEDICOLITERARY NOTES.

The increase of popular interest in health and medical matters is shown by the number of plays dealing with subjects related to medicine that have been produced in New York this season. Among the most noteworthy have been *The Straw,* about tuberculosis; *The Hand of the Potter,* a study of degeneracy in some of its social bearings; *The Verge,* a picture of neurotic temperament; *The Bill of Divorcement,* with shell-shocked husband and father, nervous, highstrung daughter, "queer" aunt and "asylum" doctor; *The National Anthem,* with its antijazz and prohibition propaganda, and *The First Man,* recently opened at the Neighborhood Playhouse, which deals with childbirth and abnormal grief.

* * *

May Sinclair's latest, and very brief, novel, *The Life and Death of Harriet Frean,* is not only an exceedingly clever bit of psychoanalysis in fiction, but a piece of remarkable literary and artistic workmanship.

* * *

Yerba maté, the South American substitute for tea, is considered by physicians of that country to have a certain food value. It is said that men given a plentiful supply of maté and little food have performed tasks in a way that seems explicable upon no other basis than this assumption. Maté contains little tannin, is diuretic and mildly aperient. It is usually taken without milk or sugar. One great advantage over Asiatic tea, which rapidly deteriorates after being made, is that yerba maté, after standing for hours, can be consumed without apparent ill effects, and the same supply may be used to make several infusions.

* * *

The World's Work for February, 1922, contains an entertaining interview with Charlie Chaplin, with excellent reproductions for photographs illustrating the "stunts" of the Man Who Would be Hamlet. The article is interesting as a study of the psychology of humor, of the crowd, and of the arch comedian himself.

* * *

Dr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Company of New York, has an interesting article in the *Scientific Monthly* for January, 1922, entitled Mortality of Foreign Race Stocks; a Quantitative Study of the Vigor of the Racial Elements in the Population of the United States. Several years ago he discovered that statistics showed an increasing mortality of Americans after the age of forty-five, a condition not to be found in Europe. He arrived at the hypothesis that this might be due to the character of our recent immigration. The article summarizes the chief results of testing this hypothesis. Doctor Dublin's conclusions are: 1. The several races that make up the foreign born population of New York are variable as to their natural vigor as measured by their mortality rates or by life tables. 2. With the exception of the Russians, who are for the most part Jews, the expectation of life of the foreign born is less than for the native born of native parentage. 3. Of the foreign born, Russians have the best expectation, followed in order by the Italians, the English, Scotch and Welsh, the Germans, and the Irish. The last have a particularly low expectation. 4. With the exception of the Russians and Italians the mortality is higher among these races living in New York State than in their native country. 5. This condition may be due to the difficulties of adjustment to new conditions of living; or to the poorer quality of the immigrants as compared with their people who stay at home, or to a combination of both factors.

* * *

Just now, when the medical profession and the world are lamenting the death of Dr. J. W. Babcock, pellagra specialist, it is interesting to recall that Cesare Lombroso, the famous Italian criminologist, first became renowned through his researches upon pellagra. He asserted that its true cause was the use of spoiled corn, not a fungus in corn, as had been previously believed. In the face of direct conflict with this current official theory and its supporters, by most of whom he was considered a quack, and through popularizing his ideas by traveling through the country with a cage in which he carried a chicken that he had infected with pellagra by feeding it spoiled corn, he won for his discovery the approval, first of the physicians of the pellagra districts, and finally of the profession at large. This and other interesting facts are related in a review in the *Living Age* for February 11, 1922, of Lombroso's biography written and recently published by his daughter.

New Publications Received.

THE BOOK OF LIFE. Mind and Body. By UPTON SINCLAIR. New York: The MacMillan Company, 1921. Pp. xiii-202.

MODERN ENGLISH STATESMEN. By G. R. STIRLING TAYLOR. New York: Robert M. McBride & Company, 1921. Pp. 267.

DEADLOCK. By DOROTHY M. RICHARDSON. New York: Alfred A. Knopf, 1921. Pp. xii-293.

A MANUAL OF PRACTICAL ANATOMY. By THOMAS WALMSLEY. New York, Bombay, Calcutta and Madras: Longmans, Green & Co., 1921. Pp. 233.

THE CARE OF EYE CASES. By ROBERT HENRY ELLIOT. The Oxford Medical Publications. London: Henry Frowde, Hodder & Stoughton, 1921. Pp. xii-172.

THE INTESTINAL PROTOZOA OF MAN. By CLIFFORD DOBELL and F. W. O'CONNOR. Published for the Medical Research Council. London: John Bale, Sons & Danielsson, Ltd., 1921. Pp. ix-211.

TEXTBOOK OF EMBRYOLOGY. By FREDERICK RANDOLPH BAILEY and ADAM MARION MILLER. Fourth Edition, with Five Hundred and Three Illustrations. New York: William Wood & Co., 1921. Pp. xvi-663.

A MANUAL OF SELECTED BIOCHEMICAL METHODS, AS APPLIED TO URINE, BLOOD AND GASTRIC ANALYSIS. By FRANK P. UNDERHILL. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Limited, 1921. Pp. xiv-232.

OBSTETRICS AND GYNECOLOGY. Edited by JOHN S. FAIRBAIRN, Royal Society of Medicine, etc. The Oxford Medical Publications. London: Henry Frowde, Hodder & Stoughton, 1921. Pp. xv-950.

A MANUAL OF DISEASES OF THE STOMACH. By WILLIAM MACLENNAN. With the Assistance of J. SALISBURY CRAIG. New York: Longmans, Green & Co. London: Edward Arnold, 1921. Pp. x-392.

HUMAN EMBRYOLOGY AND MORPHOLOGY. By ARTHUR KEITH, M.D. Fourth Edition, Revised and Enlarged with Nearly Five Hundred Illustrations. New York: Longmans, Green & Co. London: Edward Arnold, 1921. Pp. viii-491.

Practical Therapeutics

THE ENDOCRINES IN THE TREATMENT OF PREMATURE OLD AGE.

By Thomas Bodley Scott, M. D.,

Bournemouth, England.

Philosophy tells us to think of our bodies as a suit of clothes, that is, quite apart and distinct from our egos: in a measure of course this is right, but the practical, everyday fact remains that the body is the lodging house of the ego, and the ego cannot give notice or change its habitation in this life. This habitation again alters imperceptibly from day to day, it may be for the better or for the worse, and the ego pleasurably or painfully has to adapt itself for the time to the new order. Here again the parallel with the suit of clothes fails, for the suit wears out steadily and inevitably, but the body by daily renewing itself lives for a long time and may become, under the wise rule of the ego, even more efficient until the end comes. Our bodies claim and deserve far more respect and care than our clothes, for they are not only our tool house but our tools, and on them hangs the success of our lives.

For a time the balance of renewal and waste continues, but the day comes to all when the renewal ceases to balance waste, and this is the beginning of old age whatever the tale of our years may be. This point of time without doubt can be hastened by poor living and overwork and hastened, perhaps, more by rich living and underwork. The secret of a long and healthy life is the adjustment of supply and waste, of work that stimulates and that by its demands renews; or of idleness, that by cessation of demand, ends in inefficiency and degeneration. As in industrial life so in bodily, the unemployed soon becomes the unemployable. I shall try to show that the postponement of old age is largely possible by our knowledge of and the use of the endocrine glands. I am not talking of three score years and ten, but of that point in a man's life where work begins manifestly to deteriorate and when the mind becomes dull, nonreceptive and nonproductive.

Hitherto we have been satisfied with too short a life, though we see increasingly around us that life can be prolonged to ninety and a hundred, with comfort and efficiency. Among mammalia there is a rough rule that duration of life depends on the number of years it takes to come to maturity; multiply this by five and we get an approximate result. A cat or a dog matures in two or three years and lives to twelve or fifteen years of age. A horse matures in about five years and lives to be twenty-five years old. An elephant matures in about forty years and can live for two hundred years. So man, who matures at the age of about eighteen to twenty years, should live to be ninety or a hundred years old, and apart from the accidents of life, it is generally his own fault that he fails to do so.

In an article of this sort it would be out of place to go into the details of diet regimen, etc., that prolong or shorten life, for they are fairly well known, but I shall try to show how the endocrine glands are involved and how they can be used.

Growth and decay, metabolism and excretion are words that almost describe the physical life and they are largely under the rule of these glands. Senile decay and thyroid failure present nearly the same picture in mind and in body: the falling hair, the fallen teeth, the failing mind, the failing heart, but at the sides of the picture we see adrenal and pituitary lapses also. Each case requires analysis, but each case will respond to intelligent endocrine treatment. Perhaps the most common example is that of arteriosclerosis that ends in atheroma, in cardiac degeneration or in cerebral hemorrhage. Here the earliest sign is generally raised blood pressure, which is the result chiefly of deficient metabolism and excretion, and here thyroid treatment, if commenced early, will control and cure the rise of pressure by increasing metabolism. This effect is produced more slowly than by the nitrites but far more efficiently and permanently, though in emergencies the rapid treatment of overpressure is distinctly called for.

In one case you are treating a symptom and in the other the cause. Under thyroid treatment the heart ceases to labor as the arterial resistance falls —the dilated, overworked ventricle contracts and the shortness of breath gradually ceases.

We may make it almost an axiom that deficiency of thyroxin, such as we see in myxedema and in senile decay, means a continuously raised blood pressure and that a fully acting thyroid means a low or normal pressure. This again is proved experimentally, by the atheromatous degeneration we find in the large arteries of young animals that have undergone the operation of thyroidectomy. The pressure in myxedema is, I believe, always raised, and certainly under thyroid treatment falls to the normal.

In hyperpiesis the first aim of treatment must be to lower arterial pressure before something gives way, and even, if that should not happen, it must be good practice to lessen the strain on the heart's ventricle that the rigid or contracted arteries cause. The heart is trying to perform the labor of Sisyphus, a task that is almost hopeless under existing conditions, but one easily performed if you systematically lower the gradients in front: the lowering of the gradients is of far more importance than the raising of the *vis a tergo*. This explains the frequent observation that digitalis does far more harm than good, when the pressure is high; it may cause cerebral hemorrhage. To explain in part the beneficent action of thyroid treatment in hyperpiesis, I give an extract from Biedl. "The effects of thyroid extract upon metabolism are constant. It has already been shown that thyroid feeding in myxedema and in other conditions arising from thyroid suppression, is followed by enormously increased metabolism; similar changes, though less marked, are produced in normal subjects, although the physiological turnover is very little affected by thyroid extract. If, however, thyroxin is given continually for two or three weeks, the amount of the CO excretion will be increased by fifteen to twenty-five per cent.

The nitrogenous interchanges are invariably disturbed. The increased decomposition of albumen is expressed by an increased excretion of nitrogen, hence the nitrogen balance is a negative one.

Thyroxin also causes a considerable increase in the amount of calcium excreted in the feces, the calcium carrying off with it much phosphorus. In thyroid treatment this loss of phosphorus may cause some nerve exhaustion and should be compensated for by lecithin or pure phosphorus.

These physiological results of thyroxin feeding largely explain its results in disease. The poorly developed connective tissue of myxedema becomes absorbed and is carried away. The blood, purified by excretion of the products of malassimilation, circulates more freely and feeds the brain and nerves with better stuff: lethargy and inefficiency vanish and the thought machine works without friction. There is no longer grit in the carburetter. Without doubt the renewal of the everchanging tissues of the body is much under the control of our chief endocrine glands, and the standard of the new material much depends on their normality. They may be said to set the tune of our life and to keep it up to concert pitch. The glands involved in this good work are chiefly the thyroid and the anterior pituitary, and their lieutenants are the adrenals and the posterior pituitary: these latter help by maintaining cardiac and arterial tone and so a dependable circulation of blood. The adrenals also help in the work of metabolism but their chief office is in the earlier fighting years of life; they belong more to war than to peace and are the weapons of the fundamental primitive egoistic man. In old age they cannot be much relied upon to meet great or sudden emergencies, but adrenal extract by the mouth or adrenalin by injection possesses much of the vanished power and the same may be said of pituitrin. Their properties of raising blood pressure may be useful or harmful according to the state of the arteries. In some cases of senile failure it is unwise to raise arterial tension; pituitary does this more than adrenalin and the rise lasts longer. In spite of its action on the arteries, adrenalin is a very powerful aid in many of the emergencies of old age, and consequently it may be used in such cases regardless of high pressure. In sudden edema of the lungs and in almost any form of cardiac dyspnea, it should be our chief weapon; and it will often save life.

This is partly explained by its power of dilating the coronary arteries of the heart and by its bracing effect on the ventricles while its constrictive effect is not exercised on the arteries of the lungs and the brain.

Hitherto the properties of the anterior pituitary have not received the attention they deserve. In youth we know this internal secretion has an enormous power over development of the body and especially of the gonads. I need only mention the conditions called infantilism, gigantism and acromegaly. In senile decay, gonad failure is a most important feature: a man may be unconscious of it almost, or ignore it, but it reduces the color of life to a gray monotony. Even after seventy years of age the force that makes the world go round, especially in its higher attributes, is unconsciously perhaps, a motive power of no small consequence in our mental and bodily life. The man who has let himself become in this respect an extinct volcano, is well on the way to extinction all round.

We have all of us read of Brown Séquard's experiments with orchitic extract, but a more effectual way to restoration of power is by the anterior pituitary route. This is the prime source of gonad power and has a more far reaching effect both on the body and the brain. As in youth it governs the development of the gonads, so in old age it maintains their function and life. It may jar on our higher spiritual mind, but the fact indubitably remains that we can neither discard nor ignore those which we somewhat unjustifiably call the lower sides of our natures—they were and are an intrinsic portion of our evolutionary career. The manifestation of this part of our nature will in wise old age naturally take an altruistic rather than an egoistic direction; a beneficent philanthropy benefits the donor, perhaps, more than the people and helps to keep him young. We must regard this as a rule that no part of our glandular system can fall into disuse without a reactionary and harmful influence on all the rest.

My argument then is, that in old age, that is failing prematurely, the use of thyroid and anterior pituitary extracts should be our rule.

The state of the arteries, measured chiefly by the use of the sphygmomanometer should tell us what amount of thyroid we should use and we should not try to get the systolic pressure reduced too quickly: the heart must be given time to accommodate itself to the falling resistance. If the thyroxin causes cardiac disturbance such as irregularity or a feeling of faintness, suprarenal extract will remove this and enable the good effects of the thyroxin to be obtained. My own experience is that suprarenal extract very rarely raises the systolic pressure above the normal: it will certainly raise a subnormal pressure to the normal, but at that point there seems to be some check action which prevents a further rise. (Here I would say that in old age it is wiser to supply adrenal deficiency from without, than to whip up the failing gland with stimulants like strychnine: stimulation in old age soon spells exhaustion.) The careful, regular use of the manometer is of course imperative. The good effects of the thyroxin will soon show themselves beyond the mere fall of pressure.

The brain will work more smoothly and effectually, The sleep will be better, the respiration will be deeper and not so easily disturbed. The vertigo and tinnitus which are sometimes present will often cease and the mental condition generally will change, much as it does in the treatment of cretinism by thyroid: but a still further improvement can be achieved by the addition of anterior pituitary. Orchitic and ovarian extracts probably cause some rise in blood pressure but anterior pituitary, I believe, has rather the opposite effect. Its action seems to be the restoration of the general endocrine activity and harmonious balance: it has no bad effects that one can discover and can be given in good doses, three to six grains daily, and has certainly a tonic effect on the whole system and it seems to balance the rather depressing effects of thyroxin. Most of the pluriglandular preparations on the markets contain orchitic and ovarian extract but with a good dose of anterior pituitary these seem to be unnecessary and the cost to the public could thereby be reduced. A tablet useful in most cases has this formula:

Thyroid	2/3 grain
Anterior pituitary	3/4 to 1 grain

This can be given twice or three times daily, and seems to be more effectual if given before food. (This dose is of the dried extracts.) In cases of much debility, the anterior pituitary can well be raised to two grains per dose.

Rarely we come across cases of subnormal blood pressure in senile decay: the patients are short of breath, the circulation is very poor and their resistance to catarrhal infections very low. These patients will often respond well to a combination of suprarenal extract and anterior pituitary. Two grains of the first and one of the second. In such cases, thyroid, I think, should not be given unless the pressure rise above 145 mm. and then in small doses.

In really old people of about seventy-five to eighty years of age, in whom there has been high pressure and subthyroidism, there often comes a transition time when the symptoms belong more to adrenal deficiency. In such cases adrenal extract may be freely given with or without a little thyroid, and with anterior pituitary this often gives a new period of vigor.

Senile epilepsy occurring for the first time after seventy years of age is rare, but I have had the opportunity the last few years of watching two such cases. In the first, that of a man seventy years old, frequent epileptic attacks occurred at night only. His blood pressure was 180 mm. He has taken thyroid and anterior pituitary for three years now. His pressure is normal and he has had no fit for more than two years. His brain was in a very irritable state and there was some confusion of thought. He now seems quite normal. In the second case, a man of eighty-four years, had, in a few months, three violent epileptic attacks, lasting a considerable time—his pressure was normal, so I gave him anterior pituitary alone, three grains daily: he had no further attack for twenty months and every one noticed his mental improvement. The last month, after an accidental illness, the fits recurred and he came very near to death. Under five grains daily he is slowly recovering and has had no further fit for weeks. In the third case, a man of sixty-five years has had frequent epileptic attacks since childhood. He has lived for forty years at least on seventy grains of bromide a day, and his brain then began to show distinct signs of irritability and depression. Under anterior pituitary, half the bromide has been omitted and the fits are becoming much rarer and slighter. I hardly looked for results in this case but every one notices the mental improvement, and the altered manner.

This good effect in epilepsy has been noted in the first place in the United States and is well worth further trial, especially in the advanced years when its stimulating effect on the sexual glands must almost always be beneficial. Youth looks upon old age often without much reverence or consideration. Can this be wondered at, when we think of the spectacle too often presented? The failing mind has no initiative and is nonreceptive of any new idea, the irritable individual of rather selfish temper, steeped in egoism and whose bodily power is falling prematurely into decay or into actual paralysis. But these failures are not in the order of nature—they are evidences of physiological law breaking, due sometimes to selfindulgence and excesses, but more often to simple ignorance. One part of our nature has been used unmercifully, and another allowed to fall into disuse. The spirit, our personal bit of divine inheritance, has lost control of its servants and chaos is the inevitable result.

The ideal end of man's physical life should be as the historical end of the old one horse shay.

It will become, I think, an aphorism with a greater percentage of truth than is usual, that, barring extrinsic disease a man is as old as his endocrine glands and that their life can be maintained and prolonged by intelligent and scientific substitution therapy, resulting from this old age will be honored, instead of dreaded, and will be able to give out its stores of wisdom and experience for the oncoming generations.

A New Method in Pituitary Surgery.—Arnold K. Henry (*Dublin Journal of Medical Science,* April, 1921) thus describes his operation:

1. The operation is performed in the x ray room. A preliminary radiograph, with the instrument in position, may, with advantage, be taken several days before the operation. This can be done, using cocaine to anesthetize the nasal floor and the palate. This radiogram will give indications of the approximate elevation required, and the distance from the pivot of the tube to the sphenoidal sinus and the pituitary floor.

2. Preparation of the patient.—Urotropine should be administered for four days previous to operation. Atropine should be given just before operation to prevent the undue slowing of the heart, which had been described as following stimulation of the pituitary. Mercurochrome may be used to sterilize the site of incision in the nasal mucosa. In his series of operations, Cushing had only four cases of sepsis. Mercurochrome should diminish this risk, which is already practically eliminated by the fact that contact with skin and the mucous surface of the nasal fossa may be avoided by working through the tube of the instrument.

3. Anesthesia.—Novocaine and adrenalin may be used for the nasal cavity and palate, combined with rectal ether, given by Dr. Alfred Boyd's safe modification of Gwathmey's method.

4. This allows the patient to be placed in the seated posture with the head thrown back and supported.

5. Submucous resection of the septum.

6. The instrument is adjusted in the nose and mouth and its tube is aimed at the pituitary through the sphenoidal sinus. The approximate inclination has been estimated from the preliminary radiograph.

The remaining stages of the operation include verification of the position of the trephine by anteroposterior and profile views, which enable the pituitary fossa to be penetrated with precision in the middle line. The advantages of the method may be summarized as follows: 1. It reduces to a minimum the risk of the transphenoidal approach by giving it mathematical precision. 2. It avoids the retraction required to obtain direct vision, and so increases the immunity from sepsis which is secured by the submucous route. 3. As much can be safely accomplished by its use as can generally be achieved by other methods formidable in comparison.

Basal Metabolism of Normal Women.—Katherine Blunt and Marie Dyer (*Journal of Biological Chemistry,* June, 1921) found that there was no regular periodical variation in the basal metabolism of normal women during menstruation. Their observation in 216 cases show that there is a marked day by day variation in basal metabolism which may be expected at any time. The figures for the metabolism of these women were lower than the standard figures of Benedict or DuBois. Data were collected on the pulse rate of these subjects and no relation was found between the pulse rate and the basal metabolism, nor was there a relation between the daily variation in basal metabolism and pulse rate for the single individual.

Pituitrin in the Third Stage of Labor.—Roy J. Heffernan (*Boston Medical and Surgical Journal,* October 13, 1921) presents data which seem to justify the following conclusions: Pituitrin administered at the beginning of the third stage of labor is effective in aiding a prompt and complete detachment and expulsion of the placenta and membranes. Tetanus uteri with incarceration of the placenta does not occur from the careful use of pituitrin in the third stage of labor. Pituitrin tends to prevent relaxation of the uterus and postpartum hemorrhage during and after the third stage of labor. Manual removal of an adherent placenta should not be attempted until at least three doses of pituitrin have failed to produce detachment.

Observations on Goitre.—Paul Williams Sweet (*Northwest Medicine,* May, 1921) says that there are two types of colloid thyroid which should be treated medically: 1, Adolescent types of colloid enlargement, and 2, colloid goitres associated with a psychoneurotic nervousness. Surgery does no good in these cases and it is more than probable will do harm. All other forms of thyroid enlargement call for surgical intervention. Either general or local anesthesia may be used. If the gland is large and presses upon the trachea sufficient to push it to one side, it is probably wise to begin the operation under local anesthesia and, if a general anesthetic is resorted to, an effort should be made to hold the patient only far enough under to take the sharpness of the pain away but not to destroy the action of the voluntary accessory muscles of respiration. If a substernal projection is suspected, it should be confirmed by the x ray and this condition should be recognized before operation, if possible.

In cases of toxic goitre the line of treatment to be instituted must depend on the degree of intoxication and the havoc already wrought. The milder cases of both exophthalmic and thyrotoxic adenoma may be prudently recommended for immediate thyroidectomy. In those of even longer standing, in which there is slight evidence of cardiac change, immediate thyroidectomy may safely be performed after the patient has had a few days' rest in bed, provided the heart changes are well compensated for. In cases of toxic adenoma, showing mitral as well as tricuspid insufficiency with edema of the ankles, thyroidectomy may be performed successfully after rest in bed and the administration of large doses of digitalis, but at the time of operation the heart must be strong enough to withstand the extra load which will be thrown upon it by the thyroidectomy, at which time large quantities of the thyrotoxic material will be thrown into the circulation. All cases of exophthalmic goitre showing even moderately advanced toxic or cardiac symptoms, the patients should be placed in bed and have daily observation. They should be treated by the injection of hot water, or cocaine and urea hydrochloride in the more severe cases as a preliminary step to ligation, which may be done in from one to three or four weeks later, when one vessel may be ligated and the second ligated a week or ten days later. In a small percentage of cases, where the reaction following the ligation of the first vessel is exceedingly slight, a thyroidectomy may be safely done instead of the second ligation. If both vessels are ligated, the patients are sent home and told to desist from work of all kinds. In the worst cases the patients must remain in bed until all heart symptoms have subsided and do not reappear after sitting up for an hour or so or after walking a short distance. Most of such patients should remain quiet for four to eight weeks or longer before thyroidectomy is undertaken.

An Atypical Adiposogenital Syndrome.—Babonneix and Denoyelle (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris,* December 15, 1921) reports the case of a man aged forty-seven years presenting symptoms suggestive of both syringomyelia and the adiposogenital syndrome. Syringomyelia was suggested by the condition of the hands, atrophy of the muscles of the forearms, cervicodorsal kyphosis, loss of tendon reflexes in the upper extremities, and exaggeration of the corresponding reflexes in the lower extremities. Thermoanesthesia, however, was absent. The evidences of adiposogenital dystrophy consisted of small testicles, mammary enlargement, obesity, and the presence of lipomatous masses in various parts of the body. In addition, there were signs of increased intracranial pressure, viz., blindness and headache. This patient had had an attack of meningitis, supposedly tuberculous, at the age of six, with resulting partial blindness. At seventeen he had attacks of severe headache and syncope, which disappeared under iodide treatment continued for six months. Atrophy of the forearms and hands had set in thereafter. The authors believe inherited syphilis may have been at the bottom of the meningitic attack at six years. The hypophysis must have been involved, as shown by the adiposogenital syndrome and polyuria. In addition, the cervical cord must also have been affected. It seems necessary to admit that there were two distinct foci of disease, the one intracranial and reacting on the pituitary, and the other in the lower portion of the cervical cord.

Action of Organ Extracts on the Blood Pressure.—Roger (*Presse médicale,* January 7, 1922) asserts that all tissues and organs yield substances which act on the heart and bloodvessels. Those derived from the adrenals, thyroid, and pituitary have, in particular, been studied. The action of such substances varies according to whether they are extracted by trituration and maceration in salt solution or allowed to exude as a result of autolysis. Thus, lung extract obtained by maceration lowers the blood pressure owing to the presence of colloids in the filtrate; obtained by autolysis, on the other hand, lung extract raises the blood pressure. The same features apply in the case of liver extracts; autolyzed renal extract, however, lowers the blood pressure. A method more dependable than autolysis is that of extraction by acids or alkalies. The effects vary, however, according to which of these groups of agents is used. Extracts obtained with acids lower the blood pressure and slow the heart, at times even to the point of syncope; those obtained with alkalies likewise slow the heart but raise the blood pressure. Kidney extract produces effects similar to those of stimulation of the vagus. Yet it acts neither on the trunk nor the centre of this nerve, for the effects are unchanged after section of both vagi. If the vagal terminals are paralyzed, however, by injection of atropine in sufficient doses, the system becomes refractory to the usual effects of kidney extract. Hence, the latter is taken to act exclusively upon the endings of the vagi.

A New Calcium Salt.—Louis Gaucher (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris,* December 22, 1921) points out that the carbonate and phosphates of calcium are often poorly borne by patients when prescribed in doses of two or three grams a day for recalcifying purposes. Part of these salts is changed to calcium chloride by the gastric juice, and the chloride is too stable, as well as too soluble, to remain fixed in the tissues. Another portion of the carbonate or phosphates is eliminated through the bowel and frequently induces constipation. The amount of calcium actually remaining in the system after exhibition of these salts is certainly very small. To secure really effective calcium medication, the subcutaneous route of administration must be employed. For this purpose the author recommends a salt known as tricalcium dipropanoliodophosphite, prepared by the action of phosphorus iodide on pure, concentrated propanolic acid. Aqueous solutions of this salt, sterile and neutral or very slightly acid, keep indefinitely in the cold. Upon addition of an alkali, however, they are readily decomposed, with resulting precipitation of insoluble calcium phosphite. When brought in contact with the alkaline body fluids the solution, previously clear, becomes opalescent—practically colloidal—due to the production of exceedingly fine particles of calcium phosphite, which, in turn, yields tricalcium phosphate by oxidation in the tissues. Treatment with this salt consists in injecting daily or on alternate days one mil of solution containing 0.1 gram of the calcium salt. After twenty injections a rest of ten days is allowed to permit of complete absorption of the calcium. The salt has been tried clinically by various men in tuberculous conditions, including peritonitis and bone tuberculosis, in osteomyelitis, in hemophilia, in profound anemia, in rickets, and in scoliosis. The injections cause no local reaction nor rise of temperature. The appetite is markedly stimulated and the patients feel so much stronger that they request continuation of the treatment. They generally gain in weight, and the blood pressure curves show favorable effects. The red cells and mononuclears are increased, lime and phosphates in the urine diminish, and general nutrition is improved. Severe hemophilia is rapidly overcome. Bone repair and regeneration are markedly activated.

Quinidine in Arrhythmia.—C. Lian and V. Robin (*Presse médicale,* December 28, 1921) report four cases in which this drug was used. In three there were good results. One patient had been under treatment for mitral disease with complete arrhythmia for eighteen months. At the time of writing, after quinidine treatment, the pulse had been regular for two weeks, showing only a premature beat at long intervals. In another patient, under treatment three months, the pulse had been regular a week. In the third, the favorable effect was still present a week after cessation of the treatment, after which the patient was lost sight of. The fourth case, in which the remedy failed, was one of myocardial failure with complete arrhythmia. The drug was taken in 0.2 gram tablets, increased from two to four, up to six, daily, the larger dose being continued for two or three days. Under this treatment the pulse became regular in four to seven days. To prevent subsequent return of arrhythmia the patients took two or three tablets a day for periods of four or five days. Five or six tablets a day caused headache, dizziness or diarrhea, which stopped on discontinuance of such doses. Under treatment the patients felt better than ever before since the onset of their illness. Regulation of the pulse was sometimes preceded by a period of tachycardia. On the whole, the results are considered to have been very encouraging.

Observations on Parathyroidectomized Dogs.—A. B. Hastings and H. A. Murray, Jr. (*Journal of Biological Chemistry,* March, 1921) report the following results in a series of parathyroidectomized dogs: The P^H of the plasma was within normal limits. The carbon dioxide combining capacity of the blood was slightly diminished; the calcium content of the serum decreased in a few days from a normal value of about eleven mg. to the hundred c. c. to about five mg., a concentration which was hardly diminished subsequently. When the serum calcium reached a concentration of about seven mg., tetany developed. The phosphorus and sulphur were increased in the blood. Sugar analysis demonstrated the previously recorded postoperative hyperglycemia, but showed no other significant changes in glucose metabolism during the first few days after operation. Certain of the less obvious symptoms were noted, which seemed to be manifestations of an increased irritability of both the sympathetic and parasympathetic systems. The authors discuss certain general theoretical considerations which are offered to explain the relationship between tetany and the relative concentration of certain ions in the blood.

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NEW YORK, WEDNESDAY, APRIL 5, 1922

Miscellany.

Acute Intestinal Obstruction.—Harvey B. Stone (*Surgery, Gynecology, and Obstetrics,* May, 1921) says that the following points are believed to be true: 1. The cause of death in acute obstruction is a form of chemical intoxication. 2. The toxic chemicals are developed in the process of protein disintegration. 3. The effect of these toxic chemicals is to cause a fall in blood pressure, temperature disturbances, vomiting, diarrhea, disturbance of kidney excretion, high nonprotein blood nitrogen, delayed coagulation time of the blood, profound congestion of the duodenal and jejunal mucosa, collapse, death.

The following points are in dispute: 1. The precise chemical nature of the chief toxic factors. 2. The precise cause, bacterial or other, of the protein disintegration that results in toxin production. 3. The precise mechanism of absorption.

The clinical surgeon may derive from all of this experimental investigation the following practical suggestions: 1. A confirmation and scientific reason for the previously generally held necessity of prompt relief of obstruction, and evacuation of the contents of obstructed bowel. 2. The use of the nonprotein nitrogen content of the blood as a preoperative guide to the degree of intoxication and a postoperative guide to prognosis. 3. The postoperative use of all measures that combat severe chemical poisoning, i. e., the induction of fluid into the system, the use of heat, the washing out of stomach and lower bowel, and enterostomy opening, if there is one.

J. M. T. Finney, in the same issue of *Surgery, Gynecology and Obstetrics,* asserts that: 1. Difficulty may be experienced in making a diagnosis, especially in postoperative cases. 2. Definite diagnosis is not necessary before operative measures are begun. 3. Early diagnosis is the most important factor in the whole category. It is better that the operation should be done early than well. Better a poor operation done on a patient in good condition, than a good operation done on a patient in poor condition. 4. One is too largely influenced, perhaps, in delaying operation in the postoperative cases, by the fact, a, that the patient has just gone through a major surgical operation and both he and the surgeon dislike exceedingly to submit again to that trying ordeal; b, that so many cases, comparatively, have symptoms strongly suggesting intestinal obstruction, especially after certain forms of abdominal operation, and recover completely after rest, gastric lavage, starvation, enemata, and medical treatment, that the temptation is strong to postpone the operation unduly in the hope that relief may be afforded through these means. Hence often valuable time is lost in this way, and when operation is finally decided upon, it is too late.

Benign Gastric Ulcer in a Syphilitic.—W. Frank Fowler (*Surgery, Gynecology and Obstetrics,* May, 1921), from the review of a case and a résumé of the literature, concludes as follows: 1. Organic gastric syphilis may simulate, a, benign gastric ulcer; b, gastric carcinoma, or c, present an atypical gastric picture. 2. The diagnosis of organic gastric syphilis is often difficult and sometimes impossible. 3. A negative Wassermann reaction does not disprove the existence of syphilis and a positive reaction does not prove that a gastric lesion is specific. 4. The socalled therapeutic test is usually reliable but not infallible. 5. The röntgenographic evidence is not conclusive. 6. Exploration may not be determinative, particularly as regards differentiation from carcinoma. 7. Atypical, chronic gastric disorders which are unresponsive to the usual treatment should arouse suspicion of syphilis.

Atypical Smallpox.—C. H. Dumais (*Bulletin médical de Québec,* June-August, 1921) comments upon the mildness of many of the cases of smallpox observed in recent times. Many of the patients are not seriously ill, and fail to call in a doctor. In other instances, while the physician is called, the course of the disease is so peculiar that a wrong diagnosis is made, with consequent spread of the disease. The onset is not sudden, as in typical smallpox; there is no chill and no backache. The temperature seldom rises above 100° F., and the fever lasts but a day or two, during which the patient continues his work. The eruption sometimes appears in successive crops on the face, the body, and the extremities. This eruption is not like that described in typical smallpox. Whether discrete or confluent, the eruption does not always pass into the stage of suppuration, and umbilication is not constant. The most surprising feature has been the successive crops—and yet it was easy to see that the disorder was actually smallpox, for when an unvaccinated individual contracted the disease, he subsequently became refractory to vaccination. The scarring after desquamation often consists merely of reddish spots, which disappear rather quickly. In a man aged forty-five in whom the disease had run a course lasting about forty days, the author witnessed a relapse. The earlier eruption was healing when the patient was seized with chills and high fever; next day a fresh eruption was observed.

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Endothermy*

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It is the purpose of this paper to call attention to endothermy, a treatment of accessible malignancy which greatly reduces the danger of metastasis and the likelihood of recurrence by removing the growth as a necrotic mass instead of as a group of viable cells.

Endothermy is the production of heat in the tissues from within and embraces two procedures, desiccation and coagulation. As developed by Dr. William L. Clark, of Philadelphia, this method has, over a period of fifteen years, proved of ever increasing value in the treatment of accessible malignancy and precancerous conditions. Sufficient time has not yet elapsed for me to use the word cured, and this report is a preliminary one.

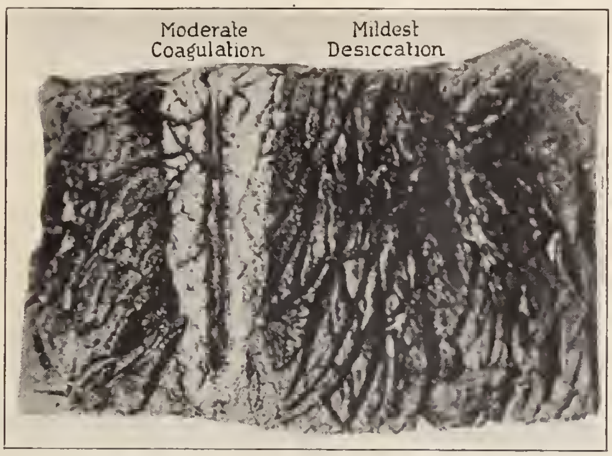

Fig. 1.—Reproduction of a piece of meat treated by endothermy to illustrate desiccation and coagulation. On the right a pinpoint area has been desiccated. On the left 1,000 ma. applied for half a minute has resulted in moderate coagulation.

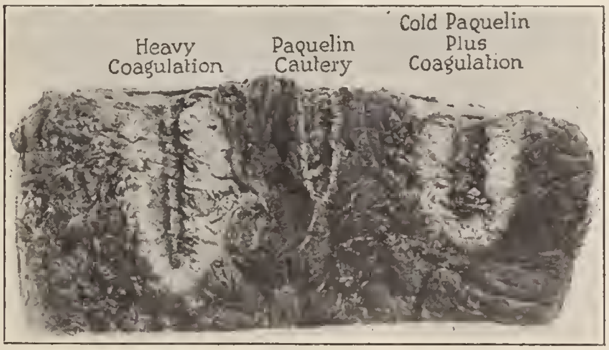

Fig. 2.—Meat treated by heavier current. Note depth of heavy coagulation at the left. In the centre a Paquelin cautery, heated to a red heat, penetrated the meat at this point and was kept going for half a minute. The effect is merely a surface burn. At the right the Paquelin applicator was thrust cold into the meat and then given 1,000 ma. for the same length of time by attaching one pole of the bipolar current. Note depth of coagulation.

In the squamous cell variety of epithelioma and the more malignant and persistent forms of accessible cancer, particularly in lesions in and about the mouth which metastasize early, are difficult of removal by the knife and are uncertain in their response to treatment, endothermy is of the highest value. Lip lesions are removed under local anesthesia. Any portion of a tongue can be coagulated and immediately removed. A cancer of the floor of the mouth can be coagulated *in situ* and the necrotic mass removed in one operation. Bony structures, alveolus, hard palate and portions of the lower jaw can likewise be treated and removed with the same degree of precision.

To its first great advantage of reduced likelihood of metastasis and recurrence endothermy adds another, the prompt alleviation of pain. If we consider the technic of the treatment we see why this is true.

The first step in the procedure is to describe in the healthy tissue a ring of destruction around the malignant area. That is, before a malignant area is touched it is completely surrounded by a wall of coagulation necrosis which shuts off and destroys the bloodvessels and lymphatics to and from the affected part. After this, the malignant growth is completely destroyed *in situ* by dividing it into sections and then coagulating or desiccating each small area. Just how much current shall be used and for how long, the operator learns by experience. Conservation demands, however, that one should overtreat rather than undertreat, for a stimulating dose is worse than no dose at all.

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*Read before the Medical Society of the County of Westchester, N. Y., March 21, 1922, at a symposium on The Cancer Problem. (*From the Vanderbilt Clinic.*)

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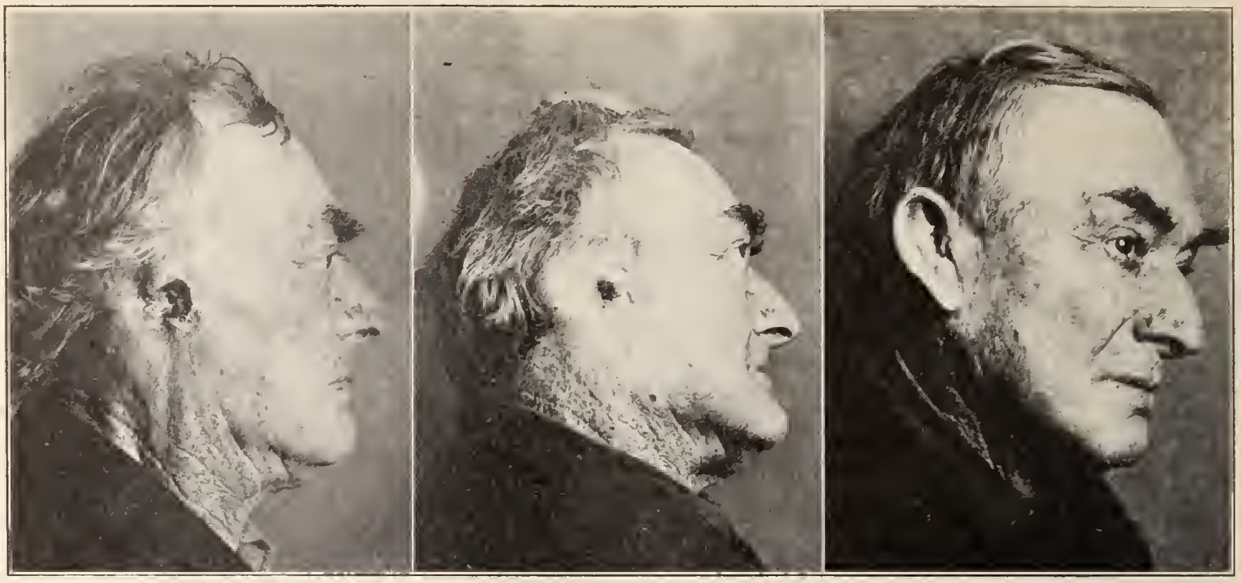

FIG. 3.—Case III, A. J. V., aged seventy-seven, epithelioma of right ear, healed after coagulation. Artificial ear made by Mr. O. A. Ilkins, New York, formerly of Walter Reed Hospital.

After the lesion has been completely destroyed it is either curetted away or removed by scissors, leaving a clean base. This base is again treated by searing over with the current to assure a further penetration by the heat and to destroy any malignant cells that may still remain.

If the work is properly done there should be no hemorrhage whatsoever. By deep penetration beyond the malignant area we render the tissues bloodless. Should by any chance a bleeding point be encountered it is easily controlled by focussing the current on it for a second or two until the heat is sufficient to stop it. Secondary hemorrhages do not often occur. However, they have happened in isolated cases and were I to work in close proximity to a bloodvessel like the carotid I should do a preliminary ligation. Or, it might be advisable to wait for a week or ten days after the operation when the slough begins to come away.

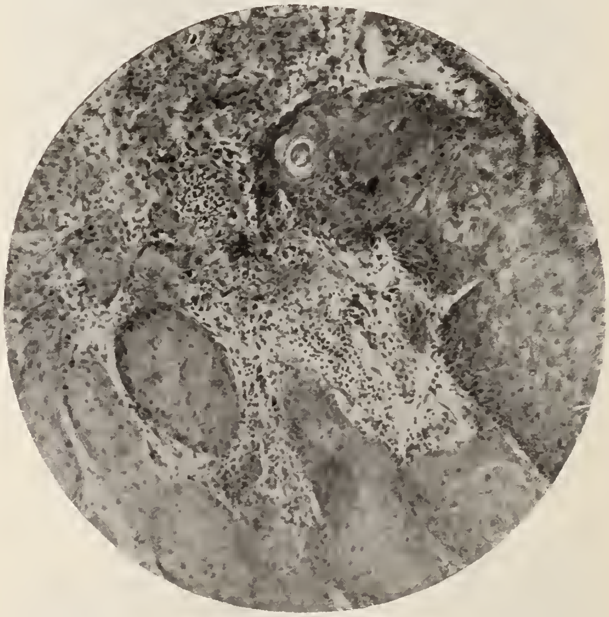

FIG. 4.—Section of nose case showing infiltrating mass of prickle cells with whorl and pearl formation and inflammatory reaction about them. (Case IV).

It is not difficult to understand that this same line of coagulation necrosis drawn about the malignant area to cut off bloodvessels and lymphatics cuts off, also, the sensory nerves and as the malignancy is removed the pain is alleviated. Unless the malignancy recurs there is no recurrence of pain. The value of endothermy, therefore, in that large group of socalled inoperable carcinoma is very great. Though used in such cases without hope of cure it provides an alleviation of suffering. In addition, the sterilizing effect of the intense heat upon a foul, discharging area is appreciated by the patient for it renders his wound less offensive. One can scarcely overestimate the importance of these features of the method, particularly in the treatment of lesions in and about the mouth. In such cases the small remaining slough comes away in from two to three weeks and the area is completely healed within a few days thereafter. The patient can thus enjoy that early return to normal diet which is of the highest importance. Since most of these patients are markedly cachectic, anemic and badly run down, their chief postoperative need is nourishment, and in a floor of the mouth case I have seen the patient gain fifteen pounds within three months after operation.[1]

Now a further word as to the nature of this method and its application. Endothermy, the production of endogenous heat, destroys, by the electrothermic processes of desiccation and coagulation, diseased tissue and accessible new growths. The precancerous dermatoses, including the various forms of keratoses, acanthoma, benign and malignant warts, moles, chronic ulcers, papilloma, lupus vulgaris, and lupus erythematosus, x ray dermatitis and other skin lesions which may become epitheliomatous, as well as epitheliomas themselves, can be removed by desiccation.

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[1] In the *Journal A. M. A.*, October 26, 1918, will be found an article by Dr. Clark giving a table and analysis of two hundred cases of cancer of the oral cavity, jaws and throat. These cases were all treated by endothermic methods or by endothermy in combination with surgery, x ray, and radium.

Herewith are presented reports of two cases treated satisfactorily by this procedure:

Case I.—C. H., aged sixty-two, had been variously treated for eighteen years for lupus vulgaris of the left face and head. The many x ray treatments had resulted in a marked chronic x ray dermatitis. Several months ago an epithelioma began to develop in his left cheek. Resisting treatment, this had progressed until at the time patient came to my attention, the wound was ulcerated and suppurating. Patient's chief complaint was the constant discharge of pus. Under ether narcosis the whole area was desiccated and curetted down to a clean base. Observe the good cosmetic result.

Case II.—J. K., aged fifty-one, was treated by desiccation for depressed epithelioma in the wing and tip of right nose. Commencing about two years ago as a scab or scale, which broke down and refused to heal, this lesion grew to be about quarter of an inch in diameter and extended almost to the mucous membrane on the inner surface of the nose. This would have been difficult to excise but it was desiccated under local anesthesia and the photograph shows how satisfactorily Nature filled in the depression, a result we could not have expected had x ray or radium been employed. After lesion had healed patient was given a prophylactic dose of x rays.

With the monopolar current, a current of high voltage and low amperage, from an Oudin resonator of a high frequency machine we cause a dehydration or drying up of the tissues. This treatment is applied with an ordinary sewing needle held in a suitable handle. With the newer machines it has the decided advantage of being subject to a fineness of control which allows one to apply the heat where he will and to what degree he will in all accessible lesions. So delicate is the adjustment it can be throttled down practically to a pinpoint area, permitting one to work in the cornea of the eye or on the vocal cords.

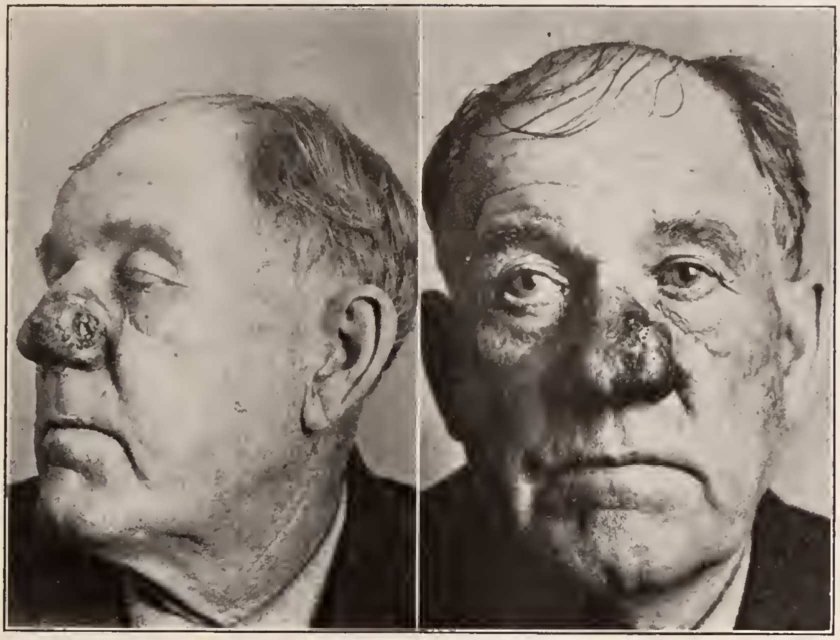

Fig. 5.—Case IV, D. G., aged sixty-six, squamous cell epithelioma of nose, healed after coagulation.

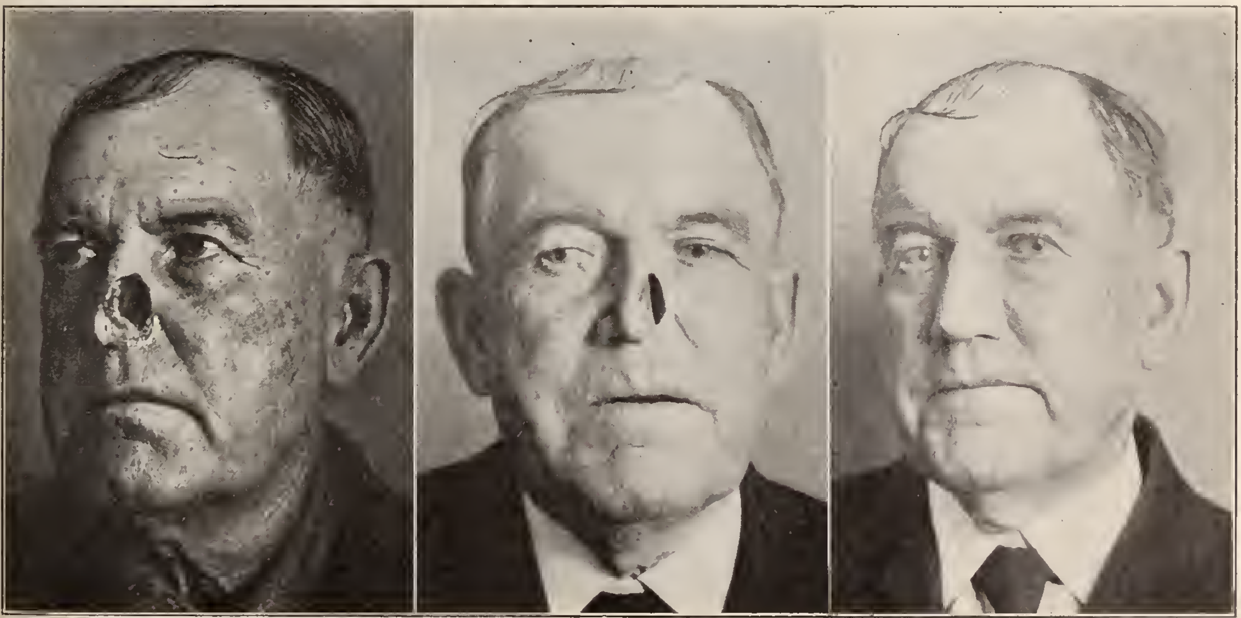

Fig. 6.—Case IV, six weeks after operation. Six months after operation. Artificial nose by O. A. Ilkins.

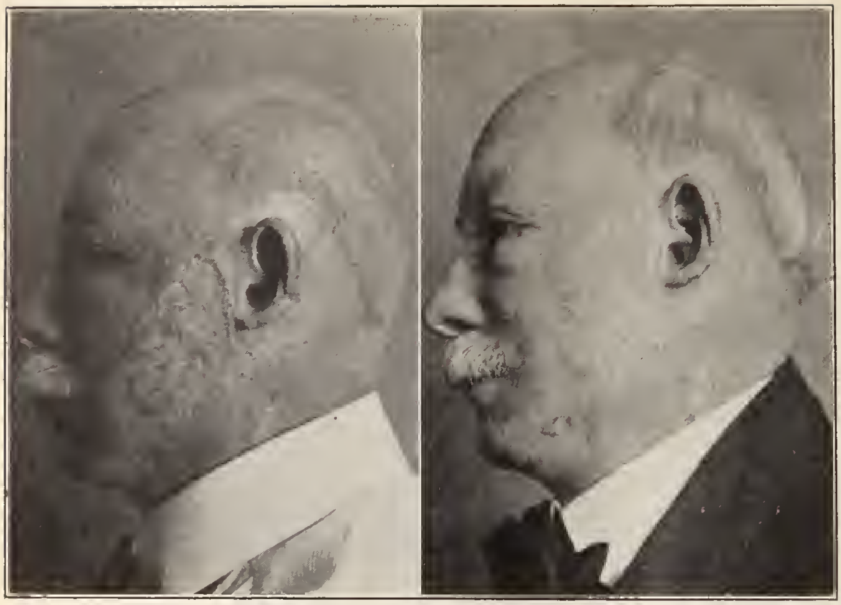

FIG. 7.—Case I, C. H., aged sixty-two, epithelioma arising in a healed lupus vulgaris; healed after desiccation.

The method is ideal for removing these small tumors of the eyelid which may be removed at their base without destroying much of the surrounding tissue. It does away with the contracted scar and consequent ectropion. Vernal catarrh responds to the brushing over of this current, as does leucoplakia. Desiccation is more or less painful and is done under local anesthesia.

Coagulation, the other form of endothermy, where the heavier and more powerful currents are used, require general anesthesia. Chloroform or ether may be given but if the latter it must be removed from the room when the current is in actual use.

By means of the D'Arsonval or bipolar current, one of low voltage and high amperage, lesions of larger size and greater depth are given the more intense, penetrating action of this endogenous heat. The result is coagulation. The heat is supplied by connecting one pole of the machine to a well wet, indifferent electrode under the patient's buttocks as he lies upon the table. The other pole, the active electrode, is attached to a handle in which is an ordinary steel darning needle. With this in hand any amount of coagulation necrosis can be described at will. Large areas on the surface may be destroyed, or smaller or larger lesions can be penetrated to any depth or coagulated through their entire thickness.

The following cases were both satisfactorily treated by coagulation.

CASE III.—A. J. V., aged seventy-seven. Eight years ago, following a scratch from a blackberry briar, a small scab appeared on the patient's right ear. His physician cauterized it and in the years that followed the lesion was variously treated by salves, pastes, scrapings and x rays. When the patient came under my care almost the entire outer ear had been destroyed except at the superior angle. It was a foul, ulcerating, suppurating cavity with considerable pus discharging from the external auditory meatus. Pressure anteriorly also caused pus to exude. The patient was much debilitated; was a chronic nephritic with a blood pressure of 220. I was therefore loath to anesthetize him and referred him to one of our largest cancer institutions for radium treatment. When this was refused, with the full consent of the family who knew the patient was a bad operative risk, under ether narcosis the wound was thoroughly coagulated and curetted. Observe lesion completely healed.

CASE IV.—D. G., aged sixty-six, reported that about three months ago he noticed a small sore on the left side of his nose which rapidly increased in size. His physician applied salves and lotions and finally sent him to a hospital where he had five x ray treatments. The lesion grew and became painful. The Wassermann was negative. Under complete anesthesia the lesion was coagulated and excised. Photographs indicate the progressive course of nature's filling in process after the operation.

Coagulation by endothermy differs from other methods of cauterization by heat in that the active electrode is cold when applied. Heat comes from within as contact is made with the electrically heated

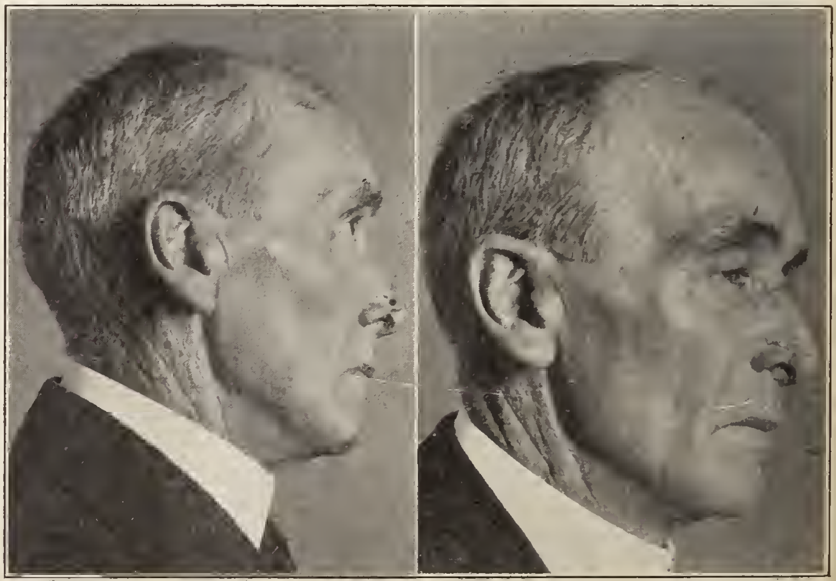

FIG. 8.—Case II, J. K., aged fifty-seven, depressed epithelioma in wing of nosee; healed after dessication.

tissues. It is therefore progressively penetrating according to the amount of current and the length of time applied. This is in contradistinction to heat applied from outside as with the Paquelin cautery, the Percy cautery or fulguration as advocated by deKeating-Hart.

Endothermy neither burns nor chars. It can be executed through a piece of paper, but I would take this opportunity to warn against its indiscriminate use. Irreparable harm may result from lack of technic.

It would appear that cases of inoperable cancer are on the decrease, partly for the reason that precancerous conditions are today, more promptly than ever before, recognized by both laity and practitioner, as possible malignancy. Another encouraging sign is the recognition by cancer specialists of the fact that no one method can successfully be employed in all cases. Though surgery remains the chief weapon against malignancy, surveying the field in general, the progressive surgeon appreciates the value of radium, the x ray, and endothermy. He again and again meets certain malignant conditions which yield to other methods more satisfactorily than to the knife.

May not sufferers from cancer confidently expect, therefore, that those charged with their care will study all the aids which are now available, suiting the treatment to the nature of malignancy?

CONCLUSIONS.

We have learned to enumerate the advantages of endothermy as follows:

1. Decreased danger of metastasis and likelihood of recurrence.
2. Alleviation of pain.
3. Practically no hemorrhage.
4. Practically no surgical shock.
5. Accuracy of dosage; current under absolute control of operator.
6. Sterilization of wound incidental to treatment.
7. Patient's postoperative condition generally satisfactory leading to quick recovery and good cosmetic result.

My thanks are due Dr. George C. Andrews for taking the clinical photographs.

167 West Seventy-first Street.

The Constitutional Symptoms of Tuberculosis*

By ALLEN K. KRAUSE, M. D.,

Baltimore.

The constitutional symptoms of tuberculosis should not call for description before an audience of this character. They are the evidences of intoxication born of the infection, expressed as unwonted fatigue response to even normal stress; overirritability of the nervous system, especially the autonomic part of it, with consequent disturbances of circulation and digestion; fever; unusual daily range of peripheral temperature, a symptom as important, in a way, as elevation of temperature, yet frequently disregarded; loss of tone of the skeletal muscles; and undernutrition. There are not a few other constitutional symptoms, but those mentioned are the more common and prominent ones, enumerated for the sake of precision and concreteness of concept. By and large, tuberculosis presents a clinical complex of a structure which is limited only by the physiological possibilities of the animal body. Any opinion, therefore, as to the relative frequency and importance of the separate constitutional symptoms runs the risk of being misleading: it all depends on what may be your purpose in rating the symptoms. Whatever your own experience and judgment, you will therefore not bear too hard on the conviction that regards what may be called fatigability as the leading constitutional symptom of tuberculosis.

For the clinical observer, the physician, attention to the constitutional symptoms of tuberculosis, even to minutest detail, and lucid understanding of them, are of supreme importance. Nothing can quite usurp their significance in diagnosis. A diagnosis of tuberculosis cannot be made with finality by anyone, unless the existence of infection is proved by physical or x ray examination or by tuberculin or investigation of infected material. Nevertheless, the diagnosis of tuberculosis now demands more than a demonstration of infection. In every case, for practical purposes, it is called upon to answer the question of whether the infection is active, in the sense of whether it is causing physical disability or contributing to it. And this is a question which will be answered, one way or the other, only by the presence or absence of constitutional symptoms. Henry Sewall was not far wrong lately, when he wrote that intoxication, that is, constitutional symptoms, is "the one dominant condition in tuberculosis" (1). Lawrason Brown speaks in a different idiom, but to the same effect: "Constitutional or general symptoms lead toward the diagnosis of tuberculosis;" and "Symptoms are a better and more accurate guide to activity than are physical signs;" and "The importance of physical examination in the diagnosis of pulmonary tuberculosis has been overemphasized" (2). I have no doubt that, in the parlance of the newspaper office, all this has long ago become "old stuff" and as dead as yesterday's newspaper. Yet a perusal of many clinical contributions on tuberculosis which are being published at this date makes me less apologetic in afflicting you with commonplaces than I otherwise might be. Apparently, the case will still bear restatement.

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The constitutional symptoms are no less momentous in the prognosis of tuberculosis. Here, again, the evidences of a man's function, of his temperature and freedom from fatigue, from circulatory and digestive disturbances and from undernutrition, under all conditions of rest, play, exercise and work, must be our guide in venturing an opinion on future events. One need not be so rigid in his standards, yet will be impressed by the dictum of the clinician of unusually vast experience, which is as Brown again makes it: "The pulse rate, together with the temperature and weight, forms the prognostic triad" (2).

The constitutional symptoms of tuberculosis proceed from intoxication, and until the nature of tuberculous intoxication is laid bare, they will deserve discussion. Any statement, such as is frequently and loosely made, that the intoxication of tuberculosis is brought about by toxins of the tubercle bacillus is marred by the stigma of attributing plain effects to specific causes which are so obscure that the most exhaustive research has failed to indicate that they exist: indeed it has suggested the contrary, namely, that there are no toxins referable to the tubercle bacillus. However, tuberculosis intoxication is real enough; and if it is not due to bacillary toxins, what then is it due to? It is the purpose of this paper to address itself to this question, briefly and in more or less summary fashion.

We find, in broad outline, intoxication occurring under two very different and distinct conditions: it appears spontaneously during the natural evolution of tuberculous infection or it may be elicited by unusual environment, and it is brought on artificially by the action of tuberculin, a specific bacillary product. So far as can be determined by observation of symptoms, it is likely that the intoxication of ordinary active tuberculosis and that of the general tuberculin reaction do not differ in kind, however they may vary in intensity and duration.

The intoxication of ordinary disease must surely develop from the bodily absorption of materials from tuberculous foci,—of elements which comprise either bacilli or the products of whatever cells enter into the constitution of foci, in a variety of physical and chemical states contingent upon the several processes of proliferation, exudation, degeneration and repair which may be going on at the time.

There are also the best of reasons for believing that the intoxication of the general tuberculin reaction results in large part, if not wholly, through the same proximate mechanism. These reasons are, 1, that the general tuberculin reaction is not to be evoked in nontuberculous animals; 2, that it is always accompanied in tuberculous animals by the focal reaction; 3, that it does not occur in the latter unless focal reaction takes place; and 4, that close observation of accessible foci will demonstrate unerringly that the focal reaction begins before the first manifestations of the general reaction.

Recognition of hypersensitiveness, as revealed by the two phenomena—not necessarily related, be it remembered—of the anaphylactic state and tissue allergy as prominent factors in every phase of the evolution of tuberculous infection is comparatively recent. It is only fifteen years since Pirquet pointed out that tissue allergy is not, as some had thought, an accidental happening in the course of this infection, but a regular concomitant of it.[1] That tubercle bacillus protein may establish an anaphylactic hypersensitiveness, as surely and definitely as may horse serum or egg white, was first shown experimentally by Gay and Southard, by Rosenau and Anderson, and particularly by Baldwin only twelve years ago.

Students of tuberculosis who, always laboring under the lack of proof of the existence of a true tuberculotoxin, had been dissatisfied with the toxin theory of the origin of the general symptoms of the disease, were not slow to grasp at the explanation offered by the demonstration of the anaphylactic state. Nothing seemed more rational than that tuberculous infection made an animal hypersensitive (in an anaphylactic sense) to bacilli or their protein derivatives, and that the constitutional symptoms of ordinary disease were the expression of an anaphylactic reaction between the hypersensitive body and focal or mobilized bacilli, while the symptoms of the general tuberculin reaction arose from the response of the hypersensitive body to artificially introduced bacillary protein (tuberculin). In either event, intoxication was set in play by the degradation products of bacillary protein which resulted from an immune reaction between antigenic bacillary protein and antibody anaphylactogen. From this point of view tubercle bacilli would contain toxins something like Wolff-Eisner's hypothetical endotoxins. Yet, while the immune process was specific, the actual poisonous agent would not be; it would be more or less the same as that of all proteins which might participate in anaphylactic reactions.

Eleven years ago I put forward an hypothesis of tuberculous intoxication in disease and during the tuberculin reaction which made anaphylactic hypersensitiveness the underlying factor (3); and attempted later to prove the hypothesis by experiment. The latter proceeded from the premise that if intoxication was the result of an anaphylactic antigen antibody reaction, through the absorption of noxious focal substances formed and released during the reaction, then these substances should be present in excess in foci undergoing tuberculin reaction and be capable of demonstration through their toxic effects on normal nontuberculous guinea pigs. It may make my point clearer by quoting the procedure of the experiment in detail from another publication (4).

A number of tuberculous guineapigs was given water extract of dried, pulverized tubercle bacilli in different amounts, with the purpose of inducing focal reactions and consequent general reactions in them. "As they fell sick they were killed at various times, some at the beginning of symptoms, some after illness was well established, and others when moribund. Their tuberculous organs showing the familiar focal reaction of inflammation were recovered and ground in mortars and the pulp squeezed out in a press. The pulp was taken up in physiological salt solution and the resulting suspension was centrifugated. The supernatant fluid was then used for intravenous injection into normal guineapigs. The result was uniformly the same. All animals thus injected became seriously ill, and generally died in from one to four minutes. The solution of tuberculous organ pulp was very dilute; the lethal dose comparatively small, as low as one cubic centimetre. Quantitative experiments failed to show that the organs of moribund animals with intense hemorrhagic focal reactions were any more toxic than those with beginning reaction, in which the focal inflammation was not visible to the naked eye."

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[1] Pirquet at first thought that allergy, as represented by the positive cutaneous reaction to tuberculin, existed only in those with clinically active disease. The fact that it is an index of infection, whether active or inactive, was settled only after several years of exhaustive practice of the Pirquet test.

The result indicated that reacting tuberculous foci contained substances which were noxious for normal animals; but nothing could be read from the experiment to suggest that materials from foci at the height of reaction were more abundant or poisonous than those from foci which were just beginning to react. It was therefore decided to perform the same experiment with substances from normal, nonreacting foci, in order to observe whether these were also inherently toxic for normal animals and to what degree.

Normal guineapigs were accordingly injected intravenously with suspensions of ordinary, nonreacting tuberculous foci, with all other conditions of the experiment—the preparation and character of the suspension, doses, etc.—exactly the same as in the previous experiment. The result was exactly similar to what happened in those animals which had received material from reacting foci: this material was also highly poisonous: ordinary, nonreacting, tuberculous foci were apparently quite as toxic—primarily so—as reacting foci.

The experiment was now extended to examine the effects of nontuberculous, normal organ pulp. The normal lungs, spleens and livers of healthy guineapigs were ground and crushed as in the other experiments, and suspensions of the pulp injected intravenously into normal guineapigs. The result was identical with that described for the other two sets of animals: normal organ pulp was just as toxic as reacting or nonreacting tuberculous organ pulp.

The outcome of these experiments was altogether different from anything that I had anticipated, and made necessary a revision of my views of the cause of tuberculous intoxication. It compelled the belief that any tissue materials, if in proper physical condition and if put into the circulation in large enough amount in a given time, will poison an animal. To produce appreciable intoxication the material must be so constituted as to be capable of entrance into the circulation and it must enter the latter in sufficient quantity in necessarily short time. Under these conditions any or all tissues, normal or pathological, may poison the body: no intermediary mechanism, such as the operation of the hypersensitive state, is necessary; enough tissue of any kind is primarily toxic, though, of course, it will of necessity have become degraded before reaching a condition which makes its absorption physiologically possible. It is very likely that the same factors are at work to bring about the well known primary intoxication (constitutional symptoms) which may follow extensive burns, or severe, comminuted fractures or surgical operations without infection. Dale's observations on the constitutional effects of degraded proteins, made known since the publication of the studies mentioned above on the influence of focal and organic materials, furnish other instances in point.

It would seem that the intoxication of tuberculosis in the natural evolution of the infection is in large measure a nonspecific process, brought about by the absorption of material from foci in amounts large enough to produce symptoms. The amount absorbed at any time will vary with several variable factors of both foci and the animal body and organ involved. The amount necessary to elicit symptoms will no doubt also vary with the individual animal: for instance, human beings vary markedly in the stability or irritability of their autonomic nervous systems, which respond with peculiar delicacy to the intoxicating substances of tuberculosis. We would therefore presuppose that basically every person has his own capacity of reacting, even though the quantity of absorbed material were the same and what we might call the "standard intoxicating dose."

In tuberculosis we have, *par excellence,* a focal disease, with morbid structures always *avascular* themselves, and invested and marked off in varying degree from tissues in which they lie. Physiological communication between them and the body may go on through the intermediation of those bloodvessels in which tuberculous processes reside and may come in contact with the lumina; such anatomical relations are not especially infrequent. But in by far the greatest number of infections physiological communication between foci and enveloping structures is through the medium of tissue lymph. Facility of communication varies with the degree and completeness of tuberculous investment; and activity of communication depends, with everything else equal, on the physiological activity, at any time, of the tissues around the foci.

For instance, respiratory and circulatory variations (and both systems are in constant flux) bring about changes of blood flow and content in the affected organ and, as a consequence, of lymphatic flow and amount as well. Any anatomical and physiological (normal or pathological) conditions of the enveloping tissues which promote circulatory activity in them and permeability of the tuberculous investment will make for intoxication, inasmuch as there are then established those mechanical relations which favor the absorption of focal materials; and focal materials are poisonous.

The focal materials which are poisonous are derived from the constituent cellular elements of tubercle, rather than from bacilli. Anyone who cares to make the experiment can readily discover the primary toxicity of tubercle bacilli or their protein derivatives. He will find that enormous numbers of living or intact dead bacilli will fail to produce the least symptom of illness upon injection into the normal animal, and that the injection of excessive amounts of bacillary derivatives are just as innocuous. I have no doubt that by proper methods of chemical cleavage, some substance could be obtained from tubercle bacilli, if large enough quantities were used, which would elicit primary intoxication in animals. But we must remember also that in many cases of infection (surely the greater number) the numbers of bacilli concerned are relatively few and are not to be compared to the large quantities which we are accustomed to deal with experimentally. A few cubic centimetres of tuberculin represent the derivative of enormous masses of bacilli; yet tuberculin elicits no symptoms in the normal animal.

We frequently meet with few symptoms of intoxication in patients who are expectorating unusual numbers of bacilli; in cavity cases, for instance. Here, of course, we are dealing with well walled off cavities which permit of but slight absorption of focal material which is, besides, being readily evacuated: and, even though it could be shown that bacilli are, directly or indirectly, responsible for most of the intoxication of tuberculosis, we would understand why such patients present few symptoms. On the other hand, some patients with rapidly caseating tubercles labor under profound intoxication; yet, as is well known, their lesions may contain few bacilli. Bacilli are not a prominent pathological feature of certain stages of generalized, miliary tuberculosis, a condition marked clinically by great intoxication and pathologically by inumerable foci of cellular proliferation and exudation with relatively slight focal investment.

We have been speaking of the intoxication that normally occurs during the course of active tuberculosis, which in so many cases comes and goes, or increases and diminishes with the activity of the patient, with overexertion and release from strain, with intermittent acute disease and good general health; in other words, with physiological (pathological) overactivity or relative inactivity, which in the first case enhances the conditions of focal and tissue "give and take," in the second lowers them.

I cannot here go into the details of explanation of the general tuberculin reaction; but would refer those interested to another publication (5). It would appear that when tuberculin is injected into the tuberculous, and therefore hypersensitive, animal, an immune reaction takes place at the focus. The visible result of this reaction then is acute focal inflammation. An effect of this inflammation is an increased absorption of focal materials, as well as perhaps physical and chemical changes of these, which help to render their absorption easier. The result of such absorption is intoxication where none existed before or an increase of intoxication already present. Thus, entering into the general reaction is first, a specific immune process, the focal reaction, and second, the effect of the latter on the body, namely, a nonspecific intoxication brought on by poisonous substances elaborated in the focus and going from there into the circulation.

Yet, to deny that bacillary constituents do or may participate in the intoxication of tuberculosis is to disregard outstanding features of tuberculous infection which are well known to experimenter and clinician.

If an animal with tuberculosis, even with relatively slight and nonprogressive infection, is reinoculated with living tubercle bacilli, it falls acutely ill. Constitutional symptoms become manifest within a few hours after inoculation and continue for a day or two, when the animal either dies or starts on the road to recovery. If autopsy is performed at the height of the illness or after the natural death of the animal, two types of lesion are found. These are, 1, inflammatory reaction of the old foci of disease resulting from first infection, and 2, acute inflammation of tissues at the points where the reinoculated bacilli have localized.

Now, living bacilli will act upon existing foci in the same manner as will tuberculin; that is, they will cause focal reaction and consequent general reaction with constitutional symptoms. To this extent they may conceivably contribute to the production of acute illness which follows reinfection. But it would seem that this is only an added and accessory and perhaps minor part of the illness. An animal (guineapig) with slight and well invested lymph node tubercle certainly will not be made as rapidly and as profoundly ill by the injection of several cubic centimetres of tuberculin as it will be by the reinoculation of relatively few bacilli which would represent far less protein than the amount of tuberculin mentioned.

I have observed the reactions of many hundreds of tuberculous guineapigs both to living bacilli and to tuberculin; and my net impression is that the intoxication after reinoculation with bacilli includes elements which can be explained only by attributing some of the effect to the direct influence of bacillary constituents. It is true that there is a rapid outpouring of inflammatory elements wherever bacilli lodge, and that the rapid intoxication may conceivably be due to absorption of these exuded materials, as may conceivably happen in the lobar pneumonia which comes on abruptly, with rigor and prostration, with a precipitate formation of congestion and inflammation; yet, until this mechanism is disclosed with more precision, the explanation will strike me as quite obscure and I shall continue to entertain the working hypothesis that in these cases of widespread or comparatively concentrated reinfection, an animal body, made hypersensitive by prior infection, in some way rapidly degrades bacilli into materials which are poisonous and share in the intoxication.

This type of acute intoxication is apparently something a good deal different from the intoxication of ordinary, chronic, focal tubercle which we described earlier. It is encountered clinically at its best in those persons who, from apparent health and with no antecedent history of manifest tuberculosis, are suddenly struck down with acute tuberculous pneumonia or with generalized miliary tuberculosis. The pathogenesis of these cases postulates that in every instance they are autogenous reinfections from older quiescent foci. These latter break through and into a bloodvessel or major lymphatic trunk, or, it may be, a caseous lymph node at the pulmonary root, or an unsuspected focus in the lung discharges its contents into a bronchus; and large quantities of infectious material are either spread broadcast to many points at the same time or are concentrated in one relatively limited place. As I conceive it, the constitutional symptoms—in a few instances there may even be rigor and these represent the only cases of tuberculosis in which rigor occurs—come on within minutes or, at the most, hours after the catastrophe has taken place. As a rule we must wait for days before the localizing signs develop, which, of course, represent the developing anatomical changes. They may not come to light until the stormy part of the illness is past.

Identical bacillary eruptions may, of course, occur in patients who are being treated for tuberculosis of whatever type, and the result will be the conversion of active, chronic tuberculosis into acute tuberculosis or an intensification of what was already an acute tuberculosis.

After an analysis, such as this account has attempted, we begin to realize how complicated the wellsprings of tuberculous intoxication may be; and I assure you that I have not striven for complexity: I have tried to resolve intoxication into its simplest elements, basing my analysis on both experimental and clinical evidence which seems to me well substantiated and which must be given its weight.

The course of active tuberculosis in itself represents, no doubt, a wellnigh irresolvable complex. There are no doubt cases, many of them, which during the entire period of activity evolve and recede without bacilli being conveyed to points outside of the active focus and setting up reinfection elsewhere. There are other cases, again, many of them, in which it is plain that massive reinfections, localized or disseminated, are taking place. There are still others, perhaps the majority of cases, in which the infection progresses through reinfection, occasional or frequently repeated, by comparatively few bacilli, which have been transported by way of lymph or blood or visceral duct.

In all three types of cases we may postulate that intoxication will take place from nonspecific focal materials. In the first type, constitutional symptoms of this nature will appear whenever there arise those conditions of focal investment or physiological activity, or both, which will make possible the absorption of sufficient focal materials. In the second type there will also be this type of intoxication; but there will be in addition an acute intoxication, occurring because of the specific reaction of old foci which follows the implantation of bacilli at new places in the body (in other words, a tuberculin effect) and an acute intoxication set up by the rapid inflammation of reinfection and in part, perhaps, by the rapid destruction and dissolution of reinfecting bacilli lodging in hypersensitive soil. In the third type there will be nonspecific focal intoxication, with the acute type added whenever reinfection is extensive enough to call forth symptoms; for, just as we find that there is a limit of tuberculin dosage, below which the effects on the body are inappreciable so there is a line of reinfection below which its immediate effects will proceed without being detectable.

Taking it all in all, I am inclined to believe that acuteness of constitutional symptoms always means reinfection, that is, infection rapidly enlarging its boundaries and encroaching on and extending into healthy tissue, or infection conveyed from one point to another. At least one can take no other ground on experimental evidence; and clinical experience abundantly bears out the opinion.

The average pulmonary tuberculosis patient—not the one perhaps who has spat blood or is coughing to distress but the *average* patient—first consults us because he is laboring under the discomfort or disability of constitutional symptoms. Again, the average tuberculosis patient is, for practical purposes, cured when, and only when, we have done our part in relieving him completely of his constitutional symptoms: he is then, and only then, again a fit man. This conception of constitutional symptoms gives me, at least, a perfectly rational idea of the operation and value of rest in the therapy of the disease.

The day has long passed in which we must defend rest as our one essential weapon to combat active tuberculosis, whether it be the bodily rest of partial or complete confinement to a reclining chair, or the local rest of fixation for a tuberculous joint, or of artificial pneumothorax for a diseased lung or of the voice at a whisper for laryngitis. The more complete the rest—the inactivity—the relief from strain—of the particular area of tissue involved in tuberculosis, the less active will be its blood and lymph circulation, the smaller the consequent "give and take" between tubercle and surrounding tissue, the slighter the constitutional symptoms, and the "drier" the lesion and therefore the greater its tendency to repair.

Many of you are familiar at first hand with the work of Professor Jacobeus of Stockholm. Among his cases are a number which had had artificial pneumothorax induced, but which had not responded favorably because of pleural adhesions which tied the lung to the chest wall and thus prevented satisfactory collapse. You must have been impressed by the remarkably rapid amelioration of constitutional symptoms which frequently followed the severing of an adhesion in these cases. The result, now and again, was nothing short of spectacular. To me the most impressive part of it all was the striking demonstration of the part played by rest in treating tuberculosis; how by removing just one little adhesion and thus giving more complete rest to an already comparatively resting part, the disease at once took a turn for the better. You can take it as a good working rule that, under conditions of complete physical rest, as nearly as these are attainable, tuberculosis, unless very acute and active, takes care of itself extraordinarily well.

REFERENCES.

1. Sewall, H.: The Importance of Subliminal Symptoms and Period of Alternation of Rest and Exercise in the Treatment of Pulmonary Tuberculosis, *American Review of Tuberculosis*, 1921, v, 236.

2. Brown, L.: Tuberculosis Theses, *Ibid*, 1917, i, 193.

3. Krause, A. K.: Experimental Studies on Tuberculoprotein Hypersensitiveness and Their Possible Applications, *Bulletin Johns Hopkins Hospital*, 1911, xxii, 250.

4. *Idem:* Concerning the General Tuberculin Reaction, *Journal of Medical Research*, 1916, xxxv, 43.

5. *Idem:* Essays on Tuberculosis. XX. Some Phases of Resistance. Part IV: Immunity. Tuberculin, *Journal of the Outdoor Life*, 1920, xvii, 170.

Diagnosis and Treatment of Mental Diseases in General Practice*

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The position of the general practitioner is a peculiar and a trying one. He is always the first to see disease and he sees it in manifold forms. It is upon him more than upon any one else that the future of the patient depends. It is upon his general but detailed knowledge that the preliminary grouping of a given case is based. It is his judgment, his ability to weigh all the facts and to view the latter in their proper relations, that determines the course to be followed. If he has not the detailed information, and more especially if he lacks the power to see the facts in their proper perspective, numerous pitfalls await him. He must be very careful for the numerous fads of the day threaten not only to lead him astray but to engulf him in their absurdities.

Into the office of the general practitioner, the family doctor as I like to call him, and who I am glad to say is again coming into vogue, come a large number of most varied affections. Naturally the attitude of mind of the general practitioner is to seek for the explanation of the symptoms presented by a given patient in some visceral disturbance, perhaps in some infection, and in a large number this attitude leads to a correct interpretation of the case. However, there is a not inconsiderable number, a number varying from twenty to twenty-five per cent., in which this attitude if too closely adhered to leads the physician into error. I allude here to cases of nervous and mental disease, especially in their early and incipient forms. Many of the latter present symptoms suggesting visceral disease; it may be of the digestive tract or of the heart, or the patient may complain—and this is very common—of pains or other distressing sensations referred to this or that part of the body. Under these circumstances we should bear in mind that the symptoms may have their origin in some general affection of the nervous system, perhaps a functional disorder or a beginning mental disease. The recognition of the truth under these circumstances is of an importance that cannot be overemphasized. It is a common experience to see patients in whom, owing to a lack of this recognition, the most varied and at times radical medical and surgical measures have been undertaken and all without avail.

One of the facts that is most commonly disregarded is that the functional nervous disorders, for example, hysteria, neurasthenia, psychasthenia and hypochondria, are affections which have their origin in the nervous system primarily; i. e., they are primarily nervous diseases. How absurd it is to seek in such cases an explanation of the symptoms in a focal infection or in a visceral ptosis as is so often done. The same thing is true of many mental diseases, notably the various forms of dementia præcox and of manic depressive insanity. These are nervous diseases primarily and bear no relation to visceral disease, on the one hand, nor infection on the other. The truth is that the neurotic and insane patients as a group are characterized by a general biological inferiority; an inferiority which is often evidenced in the very person of the patient. Morphological arrests, aberrancies and deviations, peculiarities of the glands of internal secretion, irregularities, precocities or retardations of structure and of function, all play an unmistakable rôle. Sooner or later such organisms break down under the mere strain of living and various clinical pictures result. Surely it is alike unphilosophical and unscientific to ascribe the symptom groups in such cases to focal infection, gastric or intestinal ptosis, or other visceral peculiarities. Such visceral peculiarities are themselves merely part and parcel of the general morphological or biological inferiority from which these patients suffer, and efforts at their correction necessarily fail. The same is true of the focal infections. A focal infection, if discovered, should, of course, be adequately treated, but that the underlying neurosis or mental disease will disappear upon surgical procedures or upon the administration of autovaccines or what not, is an expectation that will inevitably meet with disappointment. The lesson to be learned from this general truth is that the physician should study his patient as a whole; otherwise there is grave danger that he will be sidetracked or that he will not see the forest for the trees.

I can make my meaning clear, perhaps, by calling your attention to another group of cases, namely, tabes and paresis. Both tabes and paresis, especially the latter, often begin in a way that suggests a general nervous exhaustion and at other times in a way that suggests visceral disease. To mistake an early tabetic or paretic for a neurasthenic is unfortunate, but to mistake such a case for visceral disease may be very serious. Time and again I have known such patients to be submitted to grave surgical procedures; thus a tabetic subsequently under my care, had had an exploratory laparotomy for a supposed disease of the stomach; he still suffered from his gastric crises when he came under my observation. Another had had an exploration of the kidney for supposed renal calculus. Another still, a taboparetic, had had no less than four laparotomies in the vain effort to relieve his pain. His visceral crises continued. I could recite numerous other instances. It is not an uncommon experience to receive a history of multiple surgical interference in paretic women. I had at one time a number of such cases under my observation. Happily such operations are no longer performed with the same frequency. In times past, however, the number of operations to which a given patient had been submitted before the underlying nervous disease had been recognized was occasionally appalling.

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It is the general practitioner, the family physician, whose duty it is not only to make the preliminary and general diagnosis, but also to protect his patients. It is evidently his duty to study his patient as a whole, to study the general condition of the latter, and, while giving attention to such local conditions as may influence the general health of the patient, not to overemphasize their importance. Common sense and judgment must be used; not every tear of the perineum or cervix demands operation; for many of these lesions are within the physiological limits; and so it is with other features, presented by the patient. Neither teeth nor tonsils should be needlessly sacrificed, nor should the patient be submitted unnecessarily to tedious and expensive laboratory investigations. Not every patient requires a gastric analysis, not every patient requires an x ray examination of the intestinal tract. It is a just reproach to the profession of today that the making of a diagnosis often occupies not only many days but often weeks and at a great expense to the patient, and often results merely in a long series of negative or inconsequential laboratory reports. That under these circumstances the patient's confidence finally wavers is not surprising.

It is particularly in functional nervous cases that protracted and elaborate laboratory examinations are usually not indicated. Examinations of the blood and urine are of course the order of the day; but as regards other laboratory studies and the calling in of experts to examine the various special sense and other organs, the physician should use his common sense. Special examinations should be made only when especially indicated.

In my opinion the general practitioner should rely largely upon his clinical examination. This, after all, is not only a necessary but a safe guide to the diagnosis. In the neuroses and psychoses it is indeed not only the principal but the most valuable method. It is not difficult of application. The recognition of the great neuroses offers no special obstacles. Neurasthenia presents the symptoms of chronic and exaggerated fatigue; it is justly termed the fatigue neurosis and its symptoms differ radically from those of the weakness accompanying diseases of the viscera. The latter are, of course, distinguished by their special clinical characteristics.

Hysteria, a neurosis largely hereditary, presents a special symptomatology, a series of sensory, motor and other stigmata, all of which are characterized by the fact that they owe their appearance and disappearance to suggestion, are clearly mental in origin, and bear no relation to nerve distribution or other anatomical facts. Psychasthenia is distinguished by the fact that in addition to the symptoms of nervous exhaustion there are present the symptoms of the special fears, the phobias; anomalies of the will resulting in aboulia; chronic indecision resulting in the insanity of doubt, and those defects of inhibition which give rise to the tics and kindred disorders. Hypochondria, finally, is distinguished by the fact that the patient suffers from an all convincing sense of illness, while the examination fails to reveal the slightest evidence of visceral disease, of neurasthenia or of hysteria. In short, each one of the cardinal neuroses is distinguished clinically by its own symptom group. There are not present in any of them the evidences of infection or of visceral disease; they are nervous disorders pure and simple. In the average case none but everyday routine laboratory examinations are indicated, such as should be made in every case no matter what its character.

Every now and then patients said to be nervous are brought to the physician's office by relatives or friends. The fact that the patient does not come of his own accord, especially when an adult, but is *brought* to the office is always suggestive of mental disease. Quite commonly the relatives state that the patient has been nervous for some time past and give little other information of value unless they are closely questioned. Very often the information is elicited that the patient has not been able to keep up with his work at school, or if he is older, in his occupation; that at times he has been confused, at times excited, disturbed or it may be even hallucinatory. Examination may reveal that the patient answers slowly, that it is difficult to hold his attention or that the answers are not full or quite responsive. Sometimes confusion, mild in character, is manifested, and at times delusive ideas distinctly persecutory in type. The physical examination from the neurological point of view may be negative; on the visceral side there may merely be atony of the digestive tract and perhaps lividity, duskiness or coldness of the extremities. The patient, too, may be in a condition of exhaustion and his relatives may give an account of ready fatigue.

Clearly, here a mental impairment serious in character is present. A dementia of youth, a dementia præcox at once suggests itself; and it should be added that this possibility should be borne in mind even when the symptoms mentioned are but slightly marked.

Perhaps the patient brought to the office is an adult. A similar history of exhaustion, inattention to business, loss of efficiency, impairment of memory, together, perhaps, with vagaries of conduct, is elicited. Among other things paresis suggests itself and we now look for certain physical signs and also have made in due course a Wassermann test of the blood and if possible also an examination of the cerebrospinal fluid.

It is a good rule to submit every case presenting nervous symptoms to the tests for gait station and the reflexes. It takes but a few minutes to have the patient make a few steps with his eyes closed, to stand with heels and toes together and eyes closed, and to examine his knee jerks; in fact, these tests should be performed in every case. There is another test, which is of supreme importance and is made with equal readiness, and that is the examination of the pupils. Here we should note not only such gross anomalies as loss of the light reflex, but inequalities and irregularities in the shape of the pupil. A typical Argyll Robertson pupil may occur early, but as a rule it occurs somewhat late. Inequalities and irregularities of the pupils frequently occur very early. As regards inequality we should remember that a difference in the size of the pupils may occur physiologically, but such difference is usually very slight. If, however, a difference in the size of the pupils is noted, and this difference is associated with a sluggish light reaction in either or both, the finding suggests paresis in an incipient stage. Again, if the inequality of the pupils is shifting in character, present at one time and absent at another, the same inference is indicated. Further, the pupil in paresis is not infrequently irregular in shape. It may be oval or ovoid or its circumference may be irregular; the circle may here or there be slightly flattened as by a cord; or it may be slightly angled. The deformities are never gross, but when present are usually very distinct. They appear to be due to an irregular innervation of the iris, and the symptom is to be regarded as the forerunner of the Argyll Robertson pupil. The irregularity, like the inequality, is usually changing and shifting; it is present at times and absent at others; indeed, the shape may change while under observation, and thus may justify the term ameboid pupil. If inequality and irregularity both obtain, the inference as regards a developing paresis is equally obvious. The light reflex is impaired or lost sooner or later; therefore, if we find that it is lessened in degree, is sluggish or retarded, the fact is very significant; equally significant is it when the pupils react unequally to light.

The clinical symptoms and physical signs being present they abundantly justify the diagnosis of paresis. The laboratory findings can under such circumstances only be regarded as confirmatory. Should the laboratory report be negative, as occasionally happens, I do not allow it to change my diagnosis. Quite frequently I resort in such cases to the old therapeutic test of a rapidly ascending course of the iodides.

As regards mental diseases other than dementia præcox and paresis, for example, the melancholias and manias and the delusional lunacies, the physician is again called upon to exercise his common sense. He should bear in mind in melancholia the ever present danger of suicide. In mania he should be careful that he has not mistaken a case of delirium with excitement for one of mania. If so, he may have the mortifying experience of learning that the patient whom he committed to an asylum made a recovery after a few days and that the commitment might have been avoided. In delirium we have the rapid appearance of active mental confusion with marked excitement and restlessness, and the obvious presence of illusions and especially of hallucinations. Such delusions as may be present are fragmentary and unsystematized and entirely unrelated. The mind of the patient is also much obscured; it is usually difficult to bring the patient to himself sufficiently to elicit a satisfactory reply to the questions asked. Delirium we should remember may occur without any evidence of fever whatever. In mania, in striking contrast with delirium, hallucinations are absent and there is a high degree of lucidity. In addition the patient is expansive and aggressive. His thoughts flow with great rapidity and he may not be at all incoherent; his manner is usually boastful and declamatory.

Without going into further details, bearing in mind these main points of distinction, the danger of error may be avoided. However, such mistakes are occasionally made and I have known a patient, an epileptic who suffered from an attack of active delirium extending over a number of days, to have been committed to an institution with the diagnosis of a mania. Shortly after his admission the delirium subsided and he became entirely lucid. As regards the delusional lunacies, the paranoid states, the physician should be equally cautious. In any event he should never be hasty about a commitment. He should take sufficient time to satisfy himself thoroughly, first as to the actual existence of insanity and secondly, as to the advisability of commitment.

In a large number of cases, e. g., early cases of dementia præcox and of paresis and the milder melancholias commitment is neither necessary nor justified. Indeed, it is the duty of the practitioner to treat these cases actively himself. Dementia præcox and melancholia call for the supporting, upbuilding and reconstructive methods applicable to all weak and exhausted states. The simple physiological principles implied by food and rest should here be employed. In many cases partial rest treatment can be successfully carried out in the patient's own home. The number of hours of rest in bed should be increased. The patient should retire early, rise late, and should lie down during a portion of each day. His diet should be generous and nutritious. Milk should be added in liberal quantities and attention should be given to the elimination by keeping the bowels open and the kidneys active and by frequent bathing. From time to time various tonic remedies may be employed and at other times this or that form of internal glandular therapy may be indicated. Quite commonly it is necessary also to employ sedatives as patients frequently suffer from insomnia. Here, of course, caution should be used. If the case does not respond to treatment and if the patient cannot be successfully cared for at home, the only resource is, of course, treatment in a sanatorium or a hospital.

As regards paresis, this in its incipiency calls for the most vigorous and intensive specific treatment. It is especially important, in my opinion, when giving the intravenous injections of arsphenamine or neoarsphenamine not to omit the mercurials and iodides. Give vigorous mercurial inunctions and iodides to the point of tolerance, and above all do not omit to practise spinal drainage at the time of giving the intravenous injections. It is also of the utmost value to employ in addition, in the treatment of paretics, rest methods whenever practicable. The use of such methods undoubtedly favors the oncoming of remissions and long periods of improvement. There is nothing really surprising in this as rest and full feeding stimulate the formation of antibodies.

In conclusion, the rôle of the general practitioner regarding mental diseases may be summarized as follows: It is his function, whenever possible, to make the diagnosis of incipient mental disease. A detailed diagnosis is not, of course, always possible but the recognition of mental symptoms of themselves is usually not difficult. Many mental cases can and should be treated outside of institutions, such as delirium, which is usually quite short in duration, some cases of confusion, some cases of stupor, cases of mild melancholia, some cases of dementia præcox, the psychasthenias, and some forms of dementia, such as mild senile dementia. In no other field of medicine is the opportunity presented for such a wide application of general principles in treatment. As already stated, the great mass of the cases is made up of individuals who are biologically defective, i. e., they have not reached the general level of average development. They bear strains very badly, are easily broken down and mental symptoms of one kind or another are prone to make their appearance. Obviously, our efforts should be directed to raising the patient to as high a physiological level as possible. It is remarkable how much can be accomplished by methods that stimulate nutrition. The ideal plan is to place the patient in bed. This gives us an opportunity, not only to examine him more thoroughly mentally but also to make a careful examination from the viewpoint of internal medicine. Rest is an expedient of great power. By its means the expenditure of energy is reduced to a minimum, the consumption of tissue is greatly diminished, and a lessened amount of waste material is thrown into the circulation. The strain upon the neuromuscular apparatus and upon the heart and bloodvessels is to a great extent removed, while the glands of internal secretion also have lessened demands made upon them. Further, we have the opportunity of instituting full feeding. Full feeding means hypernutrition, and hypernutrition not only adds to the substance of the body but also profoundly influences metabolism. In excessive feeding, for instance, protein substances which have been only partially reduced, gain access not only to the portal circulation but even pass through the liver. Once in the blood, the latter assumes the function of completing the digestion. It would appear that all the cells of the body, in addition to the special function imposed upon them by the special organs or tissues of which they are component parts, also retain the primitive function of digestion, and it would appear that in no tissue is this function better preserved than in the blood. Here the various leucocytes, the plasma, and even the erythrocytes and the blood plaques play a rôle. Hyperfeeding is as clearly indicated in the exhausted states that accompany mental disease as they are in the exhausted states that accompany tuberculosis.

The principles of rest treatment are so well understood by the profession at large that it is hardly necessary to point out the value of massage nor the necessity of frequent bathing in order to stimulate elimination, nor the very great importance in cases of hyperfeeding of keeping the intestinal tract free. After all, in the management of mental cases the practitioner must exercise his good judgment. Very often we will achieve brilliant results by the use of comparatively simple methods.

The work laid out for the general practitioner in the treatment of mental cases, especially in their incipiency—and this is the stage in which he sees them—is very large and his duties and responsibilities are very grave.

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Pyogenic Infections of the Digestive Tract and Their Biological Treatment

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Manifest malfunction and structural destruction, constituting a clinical syndrome, are usually the direct or indirect result of infection in some part of the body; the tumors are the most probable exception.

Clinical entities should be conceived as the end result of infection and represent the most manifest part of a disordered whole. In other words, the frank and evident manifestations of disease represent only an obvious phase of the disease while there are a number of other phases, remaining more or less in the background, that may be more important than the obvious manifestations. A nephritis initiated by scarlet fever which persists after all manifest evidences of the scarlet fever have disappeared is illustrative.

One of the most important contributions to medicine has been the establishing of the existence of local foci of infection and their relation to systemic diseases. Some of these foci are evident, such as the teeth, tonsils and sinuses; however, there are other foci as important which are hidden, namely, the appendix and gallbladder. We wish to call attention to foci located in the gastrointestinal tract, which constitute what we call occult foci.

OCCULT FOCI OF INFECTION.

We are of the opinion that every patient presenting a clinical syndrome, characteristic of toxemia, should be examined so thoroughly that not only the influence of apparent, but also of the hidden foci of infection can be considered at its true value. We wish, therefore, to call particular attention to the examination of the gastrointestinal tract which should constitute a routine part of every physical examination and should be most searching in character, because foci in this area are most difficult to find and to relieve. A true bacteriological picture of the intestinal flora can only be obtained after there has been a free drainage of the colon. Herter (1) and others have shown that viable cultures could be obtained from fecal contents of diarrheal stools, while the stool of a constipated person was relatively free from living organisms. We have noticed the marked difference of the bacteriological flora cultured from the undrained colon and from the drained colon in the same person, and this explains to us why many stools are reported as being free of colon bacilli and pyogenic cocci. Cultures obtained from a freely drained (*2*) colon and grown upon a double strength meat infusion carbohydrate broth for four hours and then placed upon blood agar plates will reveal, in many instances, pyogenic cocci not obtainable from a constipated stool. Details of stool examinations have been published (3).

It is quite obvious, from our observations, that pyogenic infections of the intestinal tract have been neglected and that the removal of primary foci of infection in the upper digestive tract to the exclusion of the secondary foci in the lower digestive tract is frequently followed by failure to relieve toxic symptoms. The extensive amount of lymphatic and glandular tissues of the intestinal tract and mucous surface which is constantly exposed to infection, certainly merits a careful and searching consideration which, hitherto, we do not believe has been universally accorded to the intestinal tract. There is abundant clinical proof that gallbladder infection, with or without stone formation; pancreatitis, acute or chronic; appendicitis, acute or chronic; hemorrhoids and fistulæ, are only part of the localized structural manifestations of foci of infections having as their fountain head the digestive tract and which may culminate in an acute attack, because of the very structural formation of the tissues of these organs or tissues. Operations for the relief of these conditions often meet with failure, because the existing and not detected occult foci of infection have not been corrected.

Intestinal stasis or constipation, in the majority of instances, is the result of intestinal infection. Kinks, peritoneal adhesions, loculi, diverticula and ptosis are the result of infection. Constipation is therefore a symptom of intestinal infection in many instances. Infection alters the intestinal secretions, which in turn hinders the passage of fecal contents and there is an accumulation of feces which undergo excessive putrefactive alterations with the production of an abnormal amount of toxins and gases. These stretch the inflamed gut and aided by the mechanical agencies of weight and gravity in time result in a ptosis, and portions of the gut adhere together or to other structures causing kinks, pockets, constrictions, and, finally, a condition of adynamia.

These conclusions are derived from direct autopsy observations of the intestinal tract, and particularly the colon, in individuals who presented a clinical picture of intestinal infection characterized by emaciation, flabby skeletal musculature, and absence of subcutaneous fat. In these patients the colon was markedly dilated with extensive sacculations and filled with hard feces encrusted and adherent to the mucosa, which, when removed, stripped the mucous membrane with it. Associated with this condition are to be found patent ileocecal valves, enlarged intestinal lymphatics, Peyer's patches, mesenteric glands, biliary fibrosis, pancreatic induration, peritoneal adhesions and thickened and contracted gallbladders. In many instances, no other evidences of pathology are found to account for death.

That these conditions are the result of pyogenic intestinal infection, we have been able to demonstrate by postmortem cultures of the fecal contents, mesenteric lymph nodes and gallbladder contents, all being infected in many instances by the same organism. These pathological observations are in accord with the clinical and diagnostic laboratory findings and therapeutic results obtained from disinfecting the digestive tract, correcting to some extent the anatomical abnormalities secondary to, or resulting from the infection and by relieving the patient of his constipation through biological agencies. The removal of infection relieves the constipation and other symptoms of toxemia.

It is a known fact that neglect in properly treating gonorrhea, especially in the female, has been responsible for an unnecessary amount of destruction of generative organs and necessary endocrines. This same neglect of intestinal infections is also responsible for cholecystectomies, cholecystotomies, pancreatectomies, appendectomies, hemorrhoidectomies and the formation, in some instances, of peritoneal adhesions. We do not wish to be understood as denying the patient these operations, when the organs are acutely inflamed with abscess formation, but we do wish to state that, in our belief, many of the acute fulminating inflammations have their origin in a common source and are preventable, if we will consider the intestinal tract as a prolific source of infection and responsible for the occurrence of acute surgical conditions. The digestive tract, from the mouth to the anus inclusive, furnishes a vast and fertile field for pyogenic infections. Furthermore, if one takes into consideration the amount of glandular and lymphatic tissues distributed throughout the digestive tract, and grants the same susceptibility to infection of these glandular and lymphatic tissues as one does to other glands and lymphatic tissues, the existence of intestinal infection becomes logical.

Infection of the intestinal tract usually is associated with infections higher in the digestive tract (4). The mode of transmission is usually through transfer and may occur in any part of the digestive tract, if the natural barriers to infection are suppressed. It has been our observation that it is rare to find a person with an infected mouth who has a noninfected lower digestive tract. This observation explains to us why so many disappointing results have followed removal of foci of infection from the upper digestive tract (5). The removal of the foci of infection was partial; in other words, the secondary foci of infection in the lower digestive tract were either ignored or improperly treated and continued to act as a source of toxemia. This statement is made after careful and painstaking studies supported by clinical and experimental data. The following cases are given as exemplifying intestinal infections:

Case I.—Male, age thirty-two, at the age of fifteen began to suffer from vague abdominal pains; at the age of seventeen, eighteen and twenty-two the patient had attacks of appendicitis culminating in an acute attack necessitating appendectomy. The patient then began to suffer from furuncles, periodical headaches, lassitude, irritability and nervousness, which were slightly relieved by the extraction of some infected teeth and a tonsillectomy. Examination of the fecal contents revealed a pyogenic infection of the colon. The lower digestive tract was disinfected by mechanical drainage, simplification of the intestinal flora with protective bacteria, vaccines and dietary regimen and maintaining the simplification by adhering to a lactovegetarian diet, with a relief of all symptoms and general constitutional improvement. In studying this case it seems obvious that the infection was transferred from the upper digestive tract, early in life, to the lower digestive tract producing constipation and the infection of the appendix and the concomitant constitutional debility. The removal of the appendix did not remove or benefit the intestinal and associated oral infection. The improvement which followed the operation was temporary. Subsequent removal of the primary foci in the mouth could only afford slight relief, because the secondary intestinal infection was still active. However, the removal of the secondary foci from the intestines did give the desired relief and the patient's general health is better than it has been for years.

Case II.—Female, aged twenty-six, with a history of measles, scarlet fever, whooping cough and subject to frequent attacks of tonsillitis and laryngitis in childhood. Menstruated at twelve, suppression of menses for six months, then menses irregular until after birth of first child. Constipated from the age of fourteen. At fourteen a nervous trouble developed which was variously diagnosed as St. Vitus dance, spinal rheumatism and hysteria, and which was relieved at the age of eighteen following the treatment of two abscessed teeth. Married at nineteen and at twenty-one was delivered of a full term child. At twenty-two had another pregnancy, with albuminuria, high blood pressure and eclampsia after the birth of a full term child. Later facial neuralgia developed which was relieved following the removal of more infected teeth. At twenty-four she contracted influenza with pulmonary complications and made a slow recovery. Patient was in a state of ill health for two years complaining of attacks of migraine with nausea, excessive formation of gas after meals, with vomiting and physical prostration, and was not relieved by cathartics, enemata or drugs. Examination showed urine with a marked trace of albumin and hyaline casts, an excessive indicanuria, elevation of blood pressure, marked anemia with blood nitrogen and chloride retention. Abdominal examination showed an atrophied abdominal wall, separation of the recti, visceroptosis, a V colon and external and internal hemorrhoids. Fecal contents, after drainage, showed a profuse growth of nonhemolytic streptococcus mitis. This organism had been previously grown from the teeth and tonsils. A complete disinfection produced the following results: disappearance of the nephritic manifestations, relief from the attacks of migraine with the accompanying nausea and vomiting, return of blood to normal and a progressive improvement in constipation, a twenty pound gain in weight, disappearance of the infection of the larynx and tonsils and a general disappearance of such constitutional symptoms as nervousness, fatigue, transient insomnia and photophobia.

This patient who was infected early in life following one of the exanthemata, or through teeth or tonsils, frankly manifested her infection reaction by the socalled nervous trouble, constipation, facial neuralgia and finally her defenses were completely broken down by a pregnancy which resulted in the serious metabolic derangement known as eclampsia and nephritis. The patient, unfortunately, had not been examined for foci of infection and the obtrusive foci, the teeth and tonsils, had been treated in a desultory manner. In this case, complete dental and colonic disinfection has so improved her general health that it does not seem justifiable to remove the tonsils which now appear normal. As to a permanent cure in this case, we are not in a position to make a definite statement. The patient has gained in general health and she has been restored to a physical state which facilitates the performance of domestic duties comfortably and efficiently. The neglect to remove all infection sites in the beginning was directly responsible for her condition.

Case III.—Male, aged forty-six, first seen on September 4, 1920. He presented the classical picture of a terminal phase of cardiac decompensation. In February, 1920, examination showed a large heart and a typical shadowgraph of pulmonary edema; electrocardiographic tracings showed a marked rightsided predominance; serum Wassermann was 1+. Uranalysis showed albuminuria, indicanuria, low gravity and many casts. He was placed on antisyphilitic treatment, but grew progressively worse. Later on, was placed on digitalis, physiological effects reached, but despite the digitalization he grew progressively worse. At this time he consulted us and the previous pathological picture was found in a terminal phase.

Search for infection began and the following history is significant: For several years repeated attacks of tonsillitis; abscessed teeth and pyorrhea with removal of the abscessed teeth and permanent metallic restoration; complained for years of hemorrhoids, to us a symptom of colon infection. Examination for infection disclosed several manifestly abscessed teeth, ulcerations underneath the permanent bridgework, enlarged and inflamed tonsils. Liver was enlarged and tender, the gallbladder gave no evidence of trouble and was excluded temporarily. Colon was thickened, and the characteristic distress of an infected colon elicited on deep, but gentle palpation. Fecal contents showed a marked acidity (butyric chiefly), indol and skatol toxicity with a marked albumin putrefaction and a flora dominated by Bacillus aerogenes capsulatus and associated with some Bacillus coli and the same nonhemolytic streptococcus found in the culture from the teeth. Blood chemistry as follows: Total nitrogen, 160 mg. in 100 c.c. plasma; urea, 80.6 mg. in 100 c.c. plasma; uric acid, 11.2 mg. in 100 c.c. plasma; creatinine, 2.5 mg. in 100 c.c. plasma; chlorides, 0.71 per cent.; sugar, 0.18 per cent.; plasma carbon dioxide, 30 c.c. in 100 c.c.; blood cell volume, 34 per cent.; blood plasma volume, 66 per cent.

The patient was placed upon the following treatment: All abscessed teeth were removed and daily prophylactic treatments instituted. Colonic drainage, lactose laden diet, oral and rectal implantation of Bacillus acidophilus were given. These procedures simplified the intestinal flora in seven days and effected a corresponding diminution of the toxic elements. Two days after the teeth were removed and colonic drainage instituted the patient slept in bed, with one pillow, with little cough or dyspnea, the first time in seven months. He regained compensation and within two months resumed his business. He has been kept under observation ever since. In December, 1920, he was feeling so well that he began breaking appointments, disregarding his diet, drinking alcoholic beverages and generally abusing himself by late hours, excessive rapid stair climbing and fits of anger. In January, 1921, after two weeks of excessive wining and dining he was not feeling well, but this did not prevent his indulgence in a fistic combat, which ended in chasing his adversary for a block. This started a break in his compensation and he began coughing. A day later he changed a tire on his car, and had a return of his symptoms. After reexamination nothing could be found about the teeth or tonsils; the colon was drained and reexamined and a pyogenic infection was found to be active. He was placed on a special diet, colonic drainage, vaccine, and oral and rectal implantations of Bacillus acidophilus, omitting cardiac stimulants. Within two weeks his symptoms had disappeared.

The experience taught him that his infection could be controlled as long as he employed dietary agencies to maintain a supremacy of acidophilous organisms and regularly drained the colon of its progressive accumulations of fecal contents, despite the two movements he had each day. He realized this and once weekly had a colonic drainage. By so doing he was able to attend to business and take physical exercise; in fact, he went in bathing many times during the summer.

The striking features of this case are the rapid response to disinfection; the extreme decompensation which grew progressively worse under orthodox treatment in skilled hands; the significant infection history; the removal of dental infection; the significant stool findings and the laboratory improvement as shown by the report of May 15, 1921. The urine showed a faint trace of albumin, no casts, with no indican and a specific gravity of 1.021. Blood chemistry:

Total nonprotein nitrogen, 55 mg. in 100 c.c. plasma; urea nitrogen, 2.5 mg. in 100 c.c plasma; uric acid, 3.1 mg. in 100 c.c. plasma; creatinine, 2.1 mg. in 100 c.c. plasma; chlorides, .59 per cent.; sugar, .15 per cent.; plasma carbon dioxide, 55.6 c.c. in 100 c.c.; blood cell volume, 48 per cent.; blood plasma volume, 52 per cent.; blood Wassermann, negative; blood pressure, 120 systolic, 80 diastolic.

TYPES OF INTESTINAL TOXEMIA.

1. Putrefactive toxemia. *a*. Indolic types with indicanuria. *b*. Indolic types without indicanuria. *c*. Butyric acid types with Bacillus aerogenes capsulatus infection.

2. Pyogenic infection toxemia.

Putrefactive types of toxemia.—These may or may not be associated with pyogenic infections; however, a combination of the two types is frequent. In the indolic type of putrefactive toxemia, it has been our observation that there may or may not be an excessive indicanuria and for this reason we divide the indolic type into two classes, with and without indicanuria. The indolic type showing indicanuria is usually associated with some degree of ileocecal valve incompetency, this defect allowing the regurgitation of cecal contents into the ileum. When this occurs, great numbers of bacteria are being constantly thrown into the lower part of the ileum from the cecum and the colon bacillus finds a fertile pabulum, relatively carbohydrate free, for their growth. On such media, the colon bacillus is an active and prolific indol former. This occurs in a portion of the small intestine where absorption is rapid and the cleavage processes of the liver are broken down by overwork, with resulting excessive indicanuria and in some cases acetonuria. We have clinical proof that this is true, for we have reduced the indicanuria by feeding the patient a lactose or dextrine laden diet; these sugars, because of being slowly absorbed, are to be found in the ileum and colon, and their presence changes the colon bacillus from a putrefactive to a fermentative type. It has been demonstrated in the laboratory that the colon bacillus, when grown on a carbohydrate free medium, will produce indol, but the addition of a carbohydrate to the medium suppresses the indol forming characteristic. In the indolic type of putrefactive toxemia without indicanuria, the ileocecal valve is intact and diminishes the number of bacteria that pass upward into the ileum from the cecum and explains the relatively low indican index in some cases of manifest clinical autotoxemia. The fact that the liver may be active and able to destroy indol completely must be borne in mind in the indican free cases.

The butyric acid type of putrefactive toxemia is characterized by a gram positive flora predominated by sporulated and nonsporulated types of bacillus aerogenous capsulatus which is an anaerobic, spore-forming organism with hemolytic properties, capable of living on either a carbohydrate or protein residue. It is able to produce gas on either pabulum. As a rule, this bacillus, when the environment is favorable, seems almost to annihilate all the helpful organisms of the intestinal tract, that is, the aciduric forms and the colon bacillus. This organism is usually associated with pyogenic infection. In this type of toxemia, indican may be slight or absent, depending upon the fate of the colon bacillus. Great amounts of acids are produced, mostly butyric, with others of secondary importance as caproic, valeric and proprionic. At times, the fatty acids are neutralized by bases which are formed during the course of putrefaction; this is specially true of ammonia, which forms ammonium butyrate in excess (6). Ammonium butyrate is a distinct intestinal irritant and produces a diarrheal condition not infrequently observed in this type of infection.

It seems logical to ascribe the occurrence of aerogenous capsulatus infection as part of the pathology of virulent pyogenic infection which thickens the intestinal mucosa and in this wise inhibits the normal interchange of gases (7) between the intestinal cavity and blood stream. When the colon is freely drained and the aciduric forms are established, the intestinal mucosa is given a chance to heal and the interchange of gases is increased. When this occurs, the absolute anaerobic condition of the colon is altered and the laboratory picture shows that the gas bacillus changes from the nonsporulated state to the sporulated, evidence of an unfavorable environment having been created. This type of infection is very hard to deal with, especially from a dietary point of view.

By pyogenic infection, we mean those due to the pyogenic cocci which we have found so frequently associated with one of the putrefactive forms of toxemia. The pyogenic foci occur in the lymph follicles, Peyer's patches, lymph nodes, mesenteric nodes and intestinal mucosa. In fact, intestinal putrefaction so alters the protective secretions of the intestinal tract, as to allow infection from the upper digestive tract to gain lodgment in the previously mentioned structures of the small intestine and the colon. For this statement, we have pathological, bacteriological and clinical proof.

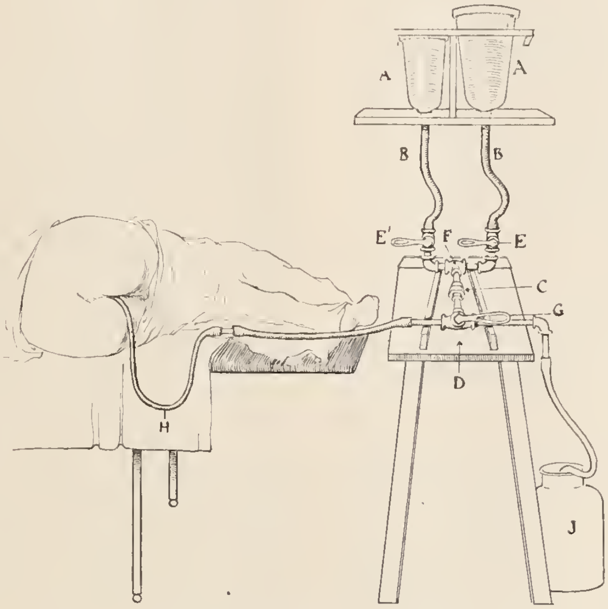

Fig. 1.—Apparatus for mechanical drainage of colon.

Pathological changes usually consist of hyperplasia of the intestinal chain of lymphatics far in excess of the hyperplasia found in lymphatics of the upper digestive tract. There is a diffuse infiltration of the intestinal mucosa with lymphocytes, eosinophiles, plasma cells and in some instances, areas of polymorphonuclear infiltration forming small abscesses. In some instances cystic glands are noted. In the more chronic cases, the submucosa is fibrous and shows hyperplastic lymph follicles and diffuse infiltration of mononuclear cells, as found in chronic appendicitis. Soon the muscular coat shows inflammatory infiltration with fibrosis and a loss of smooth musculature. The fibrosis causes a loss of elasticity of the intestinal wall, which results in intermittent dilatation of the intestines, produced by constipation, which in turn finally produces a chronic dilatation and thinning of the colon wall. Finally the inflammation extends to the serosa and there produces adhesions and the drainage of the infective substances to the spleen and liver causes fibrosis in these organs. These lesions were noted at autopsy on infected cases.

Bacteriological proof is found in the isolation of bacteria from colonic drainage and in autopsy cultures of mesenteric nodes. In numerous instances we have noted identical bacteria in these localities as were found in the teeth and the tonsils. Clinically, intestinal infection produces a multitude of disorders and diseases. The more common types of diseases associated with infections of the digestive tract are: cardiovascular renal conditions; arterial diseases; essential high blood pressures; low blood pressures; the rheumatisms; some forms of eczema; some forms of asthma; some indefinite disorders, as the socalled neurasthenic and psychasthenic states; neuritis; some forms of neuralgia; malnutritional states; some forms of obesity; diabetes; postinfluenzal asthenias; chronic constipation; autointoxication syndromes; subacute or chronic appendicitis; certain ocular conditions; protracted convalescent states, either from acute diseases, or operations, or pregnancies; chronic cholecystitis; hemorrhoids; syndromes characteristic of visceroptosis; mucous colitis; and the various indefinite digestive disorders.

RESTORING THE BIOLOGICAL FUNCTION OF THE LOWER DIGESTIVE TRACT.

The restoration of the biological function of the lower digestive tract presumes the removal or correction of foci of infection in the upper tract. Infections of the gallbladder have recently been studied by Lyon (8, 9). Our experience in gallbladder infections has not been very extensive, but has led us to believe that free drainage of the colon will indirectly drain the gallbladder, by hastening the activities of the functions of the small intestine. This obviates in these cases the intraduodenal method, and accomplishes in one operation not alone a gallbladder drainage, but also a colon drainage. There is no attempt to minimize gallbladder drainage through the intraduodenal method, as we recognize the value of this method in furnishing direct evidence for establishing a correct diagnosis, as well as its adaptability as a therapeutic measure, which bids fair to rob surgery of its ofttimes inadequate method of dealing with these types of infection. Duodenal drainage should always be combined with colon drainage in those cases in which the gallbladder infection is not relieved by colon drainage, this statement being based upon the universal association of gallbladder infections with colon infections.

The principles of treating pyogenic infections and putrefactive toxemias of the lower digestive tract resolves itself into five factors: 1. Mechanical drainage of the colon. 2. The changing of the biological processes by rectal and oral implantation of the protective forms of bacteria. 3. Maintaining a permanent normal bacterial flora. 4. Autogenous vaccines in selected cases. 5. Exercises.

1. *Mechanical drainage of the colon:* Mechanical drainage of the colon is best accomplished by the apparatus shown in Fig. 1 and consists of two percolating jars, *a* and *a'*, of three and one gallon capacity, respectively. The outlets of these jars are placed two and a half feet above the level of the patient's anus. They are connected by one inch rubber tubing, *b* and *b'*, with a control apparatus *c* on a table *d*.

The control apparatus *c* consists of a one way valve, *c* and *c'* for each jar which leads to a *T* joint *f* and from thence to a three way valve *g*. These valves and the piping have a full half inch inside diameter and insure a perfect inflow and outflow of fluid. The valves *c* and *c'* allow of the flow of fluid from the jars *a* and *a'* to the three way valve *g*. When the three way valve is in one position it allows the fluid to flow from either jar into the colon tube *h*, which tube, when inserted into the rectum, allows the fluid to flow into the colon. In another position the three way valve *g* cuts off the flow of water from the jars and allows the siphonage of the fluid within the colon into the waste jar *j*.

By this arrangement one controls the amount of fluid flowing into the patient's colon, and can easily relieve the distended colon of the injected fluid without having to employ the two way colon tube or other similar devices, which unnecessarily complicate the technic of colon drainings. This arrangement further permits of a rapid, comfortable and clean way of irrigating and draining the colon of its contents.

Drainage is accomplished by the following technic: The large jar *a* is filled with an isotonic salt solution at a temperature of 100° F., the smaller jar *a'* is filled with an isotonic salt solution at either 110° F. or 70° F., the temperature depending upon whether or not the particular colon treated peristaltically responds best to heat or cold: the distended atonic colons responding best to cold and the spastic colons to heat. When the jars are filled, the valve *e'* is turned so that the fluid from jar *a* flows into the three way valve. The colon tube *h* is then held above the level of the fluid in jar *a* and the three way valve turned in position allowing the flow of fluid into the colon tube and forcing the air out of this tube. The tube is clamped three inches from its tip and lubricated. The anus is next lubricated and the index finger of the right hand inserted with a rotary movement beyond both sphincters, which relax, and then the tube is gently inserted, unclamped, and the drainage begins. The patient is on the table in the left lateral position. Approximately one pint of fluid is instilled, the patient at this time complains of "wanting to go to stool" and then the three way valve *g* is turned so that the water from jar *a* is cut off and the fluid from the patient's colon siphons to the waste jar *j*. This empties the rectum of the contained gases and feces. The three way valve *g* is then turned so that the fluid from jar *a* again passes into the rectum, ballooning the rectum, and, when it is well ballooned, the tube is inserted and passes the valves of Houston and the socalled pelvirectal fold. This successive ballooning and siphonage is kept up until the fluid in jar *a* has been exhausted and in the meantime the tube is passed as far up the colon as possible. When the patient's limit has been reached the colon tube is clamped and the tube withdrawn. The patient arises and goes to the toilet with instructions to expel all the fluid. (Many times it will be found advisable to shift the patient from the left lateral position to the back and occasionally to the right lateral position; however, the back is usually sufficient, as it allows the passage of the tube to a high level in some instances, when such a passage is hindered in the left lateral position.) When the patient has expelled all the fluid he again resumes the left lateral position and is given the bacterial implant consisting of four heaping tablespoonfuls of lactose and twelve ounces of a liquid culture of acidophilus incubated for twenty-four hours previously in a pint of water.

The advantage of this technic over others is that there is a progressive accumulation of the fluid within the colon without producing violent peristalsis. For example, one pint is passed into the colon and this produces peristalsis, not excessive but sufficient. The siphonage removes two thirds of the pint, one third remaining. The siphonage has checked the peristalsis and the gut retains one third of a pint of fluid without irritation. The filling of the colon is progressive, comfortable, and enough time is consumed so that the fluid passes to the cecum, where it can be demonstrated by succussion sounds and palpation. The rapid filling of the colon from the small jar *a* with either hot or cold solution has as its aim the production of active peristalsis which empties the colon rapidly and completely. The ballooning of the colon sets up peristalsis which develops the musculature as well as promotes lymphatic drainage: it also tends to loosen up adhesions, straighten out kinks and clean pockets: it drains the colon of its fecal contents, numerically diminishes the pyogenic types; removes the pabulum of the harmful organisms; washes out toxic secretions and creates an environment unfavorable to the perpetuation of the harmful strains of microorganisms and favorable to the helpful forms of microorganisms.

We have found that the use of the socalled antiseptic solutions are injurious, and their use has been discontinued. All the antiseptic solutions have an astringent effect and tend to seal up the secretion of the mucous membrane, which is the natural drainage. Chlorazene, collene, argyrol, dichloramine-T, zinc chloride, the volatile oils and others have all been tried, but have not shown the beneficial results expected of them. Drug purgation has been dispensed with, as it only irritates an inflamed mucosa. The lactose accomplishes the same result and acts by the production of acids which stimulates the colon peristaltically to action, without prostrating the patient, and at the same time promotes the aciduric flora which effects a rapid simplification of the fecal flora. We simplify the flora as rapidly as possible which is the first step toward a rapid detoxication and disinfection of the lower digestive tract.

2. *Changing the biological processes of the colon.*—This is accomplished by the numerical diminution of the putrefactive and pyogenic bacteria by mechanical drainage, as just previously stated. The patient is fed on a lactose laden diet, given Bacillus acidophilus milk by mouth, rectal implants of lactose and Bacillus acidophilus, and in some instances, when shown by culture to be needed, nontoxic strains of colon bacillus. A normal and beneficial flora is obtained by this method in from three to five days and is maintained by proper dietary regimen.

In the evolution of our work we have increasingly tended to favor the Bacillus acidophilus and the colon bacillus. Formerly we used a mixed culture of bulgaricus and acidophilus, but our own observations as well as those of Kendall (10, 11, 12, 13), Rettger (14, 15), Rettger and Cheplin (16), and Rettger and Hull (17), have proved conclusively that the bulgaricus cannot be permanently grown in the human intestine. Therefore, intestinal colonization much follow along natural lines. The Bacillus bulgaricus is essentially a milk parasite, and it is irrational to attempt to accomplish with an unacclimatized bacterium that which is so easily done with the implantation of an acclimatized bacterium, as the acidophilus. We have further found that strains of the acidophilus freshly isolated from infants' stools give prompter results than those grown from generation to generation on laboratory media. In other words, those acidophil bacteria freshly isolated from a competitive environment are better than those grown in a noncompetitive environment.

ACTION OF COLON BACILLUS.

The colon bacillus, according to Herter (18), is an organism which may be useful or harmful, depending upon its microorganic environment and upon the dietary residue upon which it subsists. In other words, a colon bacillus is like a mental defective—with a lot of potential good under proper supervision, but also potentially harmful under unfavorable circumstances. A colon bacillus behaves well when grown on media containing carbohydrates and behaves badly on protein residue relatively free from carbohydrates. Herter and others have shown in many instances of constipated individuals that the feces were free from culturable numbers of bacteria which had been either killed off by lack of media, or because of certain autolytic substances which disintegrated them. For this reason we drain the colon of its retained contents and then procure a fresh stool which furnishes the cultures which give us a true bacteriological picture of the fecal flora.

Our observations have led us to believe that there are few cases in which the colon bacillus is absent in the fecal contents of a drained colon and the problem is not so much the implantation of the colon bacillus as it is to reform their biological activities; this is accomplished by the lactose laden diet. Observations have shown that the colon bacillus flourishes in association with an acidophil flora; in fact, the acidophil flora seems not only to reform them, but to stimulate their growth. For this reason we do not implant colon bacilli as a routine, unless cultures of the fecal contents of the drained stool show their absence, which is rarely the case.

3. *Maintaining a permanent normal bacterial flora.*—It has been shown that the fecal flora can be simplified within five days in most cases. However, this is the beginning of the solution of the problem, and if a permanent change of the biological processes is to be had, it requires the cooperation of the patient in connection with his diet. The change accomplished by the mechanical drainage, the rectal implantations and the oral ingestion of the protective forms of bacteria, will not be permanent unless the patient's diet is laden with lactose or dextrin. Lactose is preferred, as it is perhaps the most indigestible of sugars and finds its way into the ileum and colon, there to be changed by the protective forms of bacteria into harmless acids, which A. Schmidt (19) has shown to be peristaltic stimulators of the colon. The fact that lactose is so indigestible commends itself, because the presence of a carbohydrate in a culture medium converts the colon bacillus into a nonputrefactive organism. This is the function of the undigested lactose in the colon (20). We have devised the following mode of administration which works well in the majority of instances: the patient is instructed to fill a drinking glass three quarters full of lactose, pour on milk, water, or fruit juice, stir and drink contents—three to four such glasses daily. At first there will be a marked looseness of the bowels with flatulence, but this will subside within a few days and then the patient regulates his bowels with his doses of lactose. Dextrines may be substituted but are not as efficient or palatable as lactose. The beneficial effect of lactose upon the intestinal bacterial flora has been proved by Torrey (21, 22, 23), Rettger and Cheplin (24), Hull and others. The lactose or dextrin furnish the food for the maintenance of the supremacy of the aciduric forms, which in turn produce acetic and lactic acid, and these act as inhibitors of putrefactive processes and the growth of pyogenic bacteria.

4. *Autogenous vaccines.*—In selected cases we believe in autogenous vaccines prepared from the teeth, tonsils, and feces. This is especially true in long standing cases where there is reason to believe that involvement of mesenteric lymphatics has occurred, or in those cases with an apparent lowered resistance to infection. Even nonspecific vaccine stimulation acts in many instances as a tonic and seems to hasten recovery. Vaccines are particularly indicated when streptococci and staphylococci are isolated in large numbers from the stools. Vaccines have been of tremendous value in asthmatics, when the asthma was due to intestinal infection and protein sensitization had been eliminated. Vaccines are given over a long period of time; many cases have shown no results from a few doses of vaccines, but, by the continued use of large doses beneficial results have been obtained.

5. *Exercises.*—In selected cases, especially in those with relaxed recti muscles with visceroptosis, exercises are used. They consist of constructive calisthenic movements designed to strengthen the abdominal wall, as well as to stimulate lymphatic drainage.

CONCLUSIONS.

The conclusions set forth in this article are the result of painstaking observations with the purpose in view of either proving or disproving the clinical value of the simplification of the intestinal flora. So far as we know this technic, embracing the five factors just mentioned, as well as the insistence upon a disinfection of the upper digestive tract, respiratory tract and genitourinary tract is original in its application and seems to offer a direct avenue of approach not alone for diagnostic purposes, but also for therapeutic purposes in many diseases of obscure etiology.

The evolution of the work has necessarily led us away from some accepted time honored conceptions, which were conscientiously applied in the beginning, but did not stand the test under careful observations. We have also discarded some orthodox clinical and therapeutic conceptions, as related to the nature and treatment of certain types of diseases and we have concentrated the therapeutic attack on the cause of the disease. The patient has been considered primarily biologically and secondarily pathologically. Dysfunctions without manifest organic damage have been considered as meriting the same searching consideration accorded to dysfunctions with manifest organic damage. In fact, we cannot conceive of dysfunction without organic change, regardless of the demonstrability of the organic change. The treatment has been mainly biological and almost to the exclusion of drug therapy. We have striven to combine the best of the latest known facts as related to intestinal bacteriology and pathology and the therapeutic approach in the logical sequence of these combined facts applied to the clinical problem. This article covers the evolution of our work to date.

Emphasizing again what we have said, the problem centres about a complete disinfection of the digestive tract from the mouth to the anus inclusive, which effects a complete detoxication, and the permanency of the result is made possible by the biological reformation of the processes of the lower digestive tract, or the occult infection sites.

The problem of the disinfection and the detoxication of the digestive tract must be entrusted personally to qualified dentists and physicians and not left to the immature judgment of a prophylactic dental technician or a nurse, both conscientious enough in purpose, but woefully ignorant of the biological problem with which they are confronted and which too often puzzles the best of medical minds. The progress and success of the therapeutic principles outlined in this article are directly dependent upon the observation of the foregoing statements.

The references will appear in the author's reprints.

A Reply to Certain Antagonistic Criticism of Nonsurgical Biliary Tract Drainage

By B. B. VINCENT LYON, A.B., M.D.,
Philadelphia,

Associate in Medicine, Jefferson Medical School; Chief of Clinic, Gastroenterological Department, Jefferson Hospital.

(*Concluded from page 276.*)

It will be interesting to learn something more of Meltzer's point of view as shown in the following exchange of letters. I wrote him on May 8, 1920, a few days after I had presented this subject before the American Gastroenterological Society:

My dear Doctor Meltzer:

I was exceedingly sorry that I did not have an opportunity to see you personally at Atlantic City last Monday. I had hoped to have an opportunity to talk to you after the dinner Monday night, but was unable to find you afterwards and I did not see you on Tuesday, and presume you must have returned to New York. I wanted to ask you whether I had presented your views in regard to the physiology of the biliary mechanism accurately, and to acknowledge my debt to you for the suggestion you made in regard to the use of magnesium sulphate, which has proved such a helpful factor in opening up a much better field of investigation into the several biles, more especially that of the gallbladder.

I have always been rather curious to know whether in your experiments on dogs with magnesium sulphate in which you noted the relaxation of the tonus of the duodenal zone, relaxing the common duct sphincter, if you noticed at the same time any visible contraction of the gallbladder musculature suggesting on its part an effort to empty its contents. I have been thinking for some time of the possibility of visibly proving this on human beings by getting a tube in the duodenum of a suitable patient about to be laparotomized for upper abdominal section, passing the tube into the duodenum and fluoroscoping its location before anesthesia. Then after the upper abdominal field is fully exposed to inject the magnesium sulphate into the duodenum and observe whether or not the gallbladder shows any visible evidence of contraction. If you have already observed this in animal experimentation it would be interesting to check it up again on a suitable selected patient.

In regard to your Law of Antagonistic Innervation in discharging gallbladder bile, it has seemed to me that this is fundamentally correct when interpreted by certain elements in gastric chemistry, or with definite chemicals, such as magnesium sulphate, but I feel sure that there must be a third factor beyond the simple relaxation of the duct and simultaneous contraction of the gallbladder, namely, in a selective action that some substances have directly on the gallbladder and others on the pancreas, both of which, to discharge their material, must have a relaxed duct sphincter. For instance, benzyl benzoate, belladonna, and perhaps potassium permanganate seem to have the power to relax the common bile duct, but apparently do not make the gallbladder discharge its contents as does magnesium sulphate, at least with by no means the same amount of force or regularity. Similarly, our evidence seems to show that certain types of test meals, for instance, the carbohydrate meal, while relaxing the common duct, encourage a freer discharge of pancreatic juice and a less amount of gallbladder discharge, whereas the products of acid gastric protein digestion, as Rost pointed out, do seem to favor a larger amount of gallbladder contraction as well as a certain amount of pancreatic discharge. So it would seem to me that there may be a selective mechanism, somewhat beyond the fundamental application of the Law of Antagonistic Innervation, which *a priori*, argues that when the common duct relaxes the gallbladder must contract. I would very much appreciate having you write me your view in regard to this.

Yours very sincerely,
B. B. VINCENT LYON.

Dr. Meltzer's reply on May 11th is illuminating:

Dear Doctor Lyon:

I heard of your paper which you presented at the meeting of the Gastroenterological Association and was sorry to have missed it. On the forenoon of Monday, May 3rd, I attended the meeting of the Association for Clinical Investigation, of which I was about a dozen years ago one of its obstetricians.

As to the action of magnesium upon the gallbladder, neither have I seen, nor do I assume, that that salt causes a contraction of that organ. Since I have observed twenty-two years ago the striking soporific and relaxing action of an intracerebral injection of a few drops of a solution of magnesium sulphate, I worked on the theory that magnesium salt is the representative of the inhibitory effects in the animal body. My conception of the Law of Antagonistic Innervation has been formulated many years before my observation of the inhibitory action of magnesium. But I did state, I believe, in a paper read several years ago in Washington at a meeting of the Pan-American Congress that when magnesium sulphate comes in contact with sodium chloride it becomes in part converted into sodium sulphate, which, by its hematogenous action, may cause a constriction of some parts of a mechanism. But this is merely a speculation. But the bile in the gallbladder, as well as in the biliary ducts, is under a certain pressure which is sufficient to drive it into the intestines if the papilla of Vater is relaxed. I find myself in agreement with your view that various substances exert a selective action upon various organs and upon various parts of the same organ. The Law of Antagonistic Innervation is executed by a coordination of a variety of factors.

With cordial regards, sincerely,
S. J. MELTZER.

The following letter from Dr. Meltzer on August 2nd, and my reply of August 3rd, are also enlightening:

Dear Doctor Lyon:

I read your interesting article in the NEW YORK MEDICAL JOURNAL for July 3rd and 10th. I feel grateful to you for starting your studies and congratulate you on your beautiful success.

Permit me to make the following remark. On page 26 of your article in the NEW YORK MEDICAL JOURNAL you say: ". . . the inference was plain that if this Law of Contrary Innervation was sound, anything which would cause inhibition of tonus of Oddi's sphincter must, *ipso facto*, cause contraction of the gallbladder musculature." I may use your own words: "This is not so." The Law of Contrary Innervation applies only to the functions of organs of living animals, it does not apply to inorganic substances; it does not mean, for instance, that magnesium salts which cause a relaxation of one component of an organ must, *ipso*, cause a contraction of the antagonistic component in the same organ, or, barium salts, which, as a rule, cause a contraction of one component, cause an inhibition of the antagonistic component. Only a combination of certain salts may accomplish this end.

I am carrying on experiments on this question and may have something to say about it later. If I obtain definite results, it will give me pleasure to let you know the outcome.

Sincerely,
S. J. MELTZER.

My Dear Doctor Meltzer:

I received your letter of August 2nd, and I am very much obliged to you for writing me again your opinion in regard to your experiments and will certainly look forward to being kept informed as to what additional trend your further investigations will take. I do not believe that a sufficient portion of the medical profession appreciate thoroughly the tremendous importance of your studies, and I have endeavored to bring it home to each of the doctors that I have personally seen and written that this new field of gallbladder and duodenal work which is opening up so much better than formerly has been due so greatly to your pioneer experiments.

I am obliged to you for referring Mr. Miller of New York who brought his sister here last week. It would be a mighty good thing if some of the New York men would begin to be actively interested in this field of biliary and upper intestinal conditions.

With very good wishes and trusting that you are in better health, I am,

Sincerely yours,
B. B. VINCENT LYON.

It is probable from this second letter of Meltzer's that even he did not realize that magnesium sulphate seems to possess a truer hormonic influence on the gallbladder than do any of the other substances that have been yet tried.

As Crohn states, "It was natural, therefore, for Meltzer to think of applying the magnesium ion to the duodenal mucosa to relax locally the sphincter action. According to his conception of the double rôle of the innervation of the biliary tract such a relaxation of the sphincter should be accomplished by a contraction of the gallbladder." . . . By referring to Meltzer's letter on this page it will be seen that Meltzer did not expect this, because he, too, was not able to visualize a contraction of the gallbladder. Nevertheless his experiments, too, were conducted under full narcotization, and in addition subject to surgical trauma of the terminal innervations, and therefore of no use in determining the normal physiological reflexes.

At the end of this paragraph Crohn again mentions his failure to recover from the duodenum methylene blue injected into the gallbladder, and the error in his interpretations of its meaning I have already answered. In his final sentence in this paragraph he states that "McWhorter (28) demonstrated a lowering of pressure in the common bile duct of from fifty to one hundred mm. after magnesium sulphate had been applied to the ampulla; no result was seen after peptone solution."

Comment.—This observation further establishes my position that magnesium sulphate possesses some intrinsic property, hormonic or otherwise, that is not possessed by peptone or the other list of chemicals tried, which favors the evacuation of gallbladder contents, if in no other way than by lowering the duct pressure. So it might appear from what has been said that Premise III has been established, certainly in regard to its true physiology when the normal physiological reflexes of unstriped muscle have not been aborted or obtunded by anesthesia or injury.

Premise IV.—That fluid obtained at bedside by magnesium sulphate lavage of duodenum is gallbladder fluid, and that changes in color, consistency and amount indicate gallbladder disease.

Crohn and his coworkers now lay aside experimental theoretical considerations and attempt to draw independent conclusions from the clinical application of the case. But they say "The technic of Lyon was simplified and adapted to hospital use. The tube (Einhorn duodenal tube) was passed either the night before or in the fasting state in the morning." They used, however, smaller amounts of a weaker solution, that is, thirty to fifty c. c. of a twenty-five per cent., presumably volumetric, solution of magnesium sulphate, which I as well as Einhorn have shown are not so effective as stronger solutions. Thereafter every five minutes for one to two hours specimens were aspirated "until the color of the bile returned to that obtained before the saline lavage or until it was definitely concluded that no change in color or character was taking place. Sometimes siphonage was practised to ascertain the amount of the B bile obtained."

Comment.—In other words, they were not practising a medical drainage of the gall tract as I believe it should be done. It is not wise to pass the duodenal tube the night before, for during the night it may be that duodenal irritation from the metal tip tube might cause relaxation of the duct sphincter and permit bile discharge into the intestines even during the fasting stage, and such bile would then be withheld from observation. Since the duodenum can be so rapidly intubated when a proper technic is used, it is not necessary to insert the tube the night before. Furthermore, from a diagnostic viewpoint, I strongly deprecate the modification or simplification of technic in order "to adapt it to hospital use," because I have learned by a slow evolution that the diagnostic technic can not be simplified or shortened without assuming a risk of losing some of the information to be gained, and because I have learned from personal communications or personal talks with inquiring doctors that the reason for their failures is due most often to a faulty technic, or to an unwise modification of (usually an attempt to shorten) the original technic. I also feel that it is impossible to attempt to gain an adequate diagnostic appreciation of a gall tract drainage by intermittently (even at five minute intervals) aspirating successive specimens for purposes of comparisons. The observation of bile recovery should not be interrupted for even five minutes. It will usually flow quite readily by gravity, although at times siphonage is helpful. In studying a case one should remain by the bedside with a microscope, and carefully watch the sequence of bile delivery through an observation glass cannula, and make frequent microscopic, chemical and bacteriological examinations as indicated by gross changes in the bile and as mucopus flocculations are appearing.

Notwithstanding the practising of a faulty technic, Crohn and his associates nevertheless clinically confirmed its diagnostic soundness of this method in many of the cases which they studied, and no doubt would have been able to interpret the findings in their doubtful cases if their personal experience with the method had been larger. They met with off colored biles in sixty-five per cent. of their cases, and found at operation that sixty-two per cent. of these cases were accompanied by a pathological condition, stones or chronic cholecystitis. If they, comparatively inexperienced, could secure sixty-two per cent. of preoperative pathological diagnostic suggestion, even this comparatively low percentage would substantiate the clinical usefulness of the test. Furthermore, they "encountered seven cases in which no change of color followed the lavage. Of these, five cases had definite pathological changes associated; obstruction of the cystic duct was the presumable interpretation according to Lyon. Of our five cases without color changes in the bile three had at operation apparently stones in the cystic duct. In the other four cases of the latter series in which no change of color scale occurred no cause was found at operation to explain this phenomenon."

Comment.—Here, too, they confirm my reasoning in explanations of cystic duct obstructions, for they found in three, or forty-three per cent. of their seven cases the failure to recover B bile was definitely due to cystic duct obstruction by impacted stones, that in two of the seven cases, or nearly twenty-nine per cent., other definite pathological changes were found associated, but they do not mention what they were, whether there were adhesions, or whether the gallbladder was small, shrunken and obviously functionless, nor did they give any evidence to disprove the possibility that the cystic duct was mechanically obstructed by catarrh or inflammatory edema, which is a condition not lending itself to easy proof by the usual surgical observation. In regard to the two cases which showed no pathological change, these cases might quite as well fall into the group of gallbladder atonies, without visible surgical pathology, from which I have shown that gallbladder bile is not always recovered. In this connection, too, we must consider the importance of a "physiological block" in the cystic duct or gallbladder, due to a disturbed nervous mechanism as recently suggested by Smithies.[1]

Therefore, these observers have very largely substantiated my contentions by their own work. Furthermore, by the absence of the usual sequence of color changes, due to their inability to recover gallbladder bile for the reasons they themselves have shown, they have added another bit of evidence that the dark colored bile is derivable from the gallbladder and not from the liver, unless there be stasis within the liver due to biliary congestion or biliary cirrhosis.

Crohn again questions the origin of B bile because in thirty-eight of their cases with recoverable dark bile the gallbladder and ducts were pronounced normal at operation.

It must always be remembered, however, that there are certain pathological findings, recognizable only in the microscopy of pathological dark biles, which do not give rise to pathological changes in early stages in the gallbladder and ducts, which can be detected by surgical sight or touch. No surgeon can tell what is inside the gallbladder (with the exception of stones) by looking at its walls, and there is common enough evidence to show that such supposedly normal gallbladders are truly catarrhal or infected as their subsequent return to the surgeon for operative removal would indicate. The burden of the diagnosis in such cases must, therefore, rest upon each of us, with our several abilities to detect the pathological alterations found by microscopy.

It is necessary to make only one correction in the interpretation of B bile as expressed in my previous papers, namely, that I no longer feel that the capacity of the gallbladder can be always accurately indicated by the amount of dark bile recovered, because I have become aware that a relatively small amount of thick, tarry black bile can be diluted and thinned out to a relatively lighter brown black or green black bile by dilution with freshly secreted liver biles admixed within the ducts. Because it is evident that a few drops of blood will deeply redden to a lighter shade a glass full of water, or, to use another homely simile, that if a heavy motor oil, such as 600-W, be mixed with 3 in 1 the result is not comparable to either of the ingredients. Just so, when dark viscid gallbladder bile is mixed with C or liver bile and duodenal contents it is not the same in color or viscosity when aspirated through the tube as the materials removed at operation directly from the gallbladder. Indeed, I have seen the actual mixture taking place through the glass cannula (i. e., a lighter yellow liver bile superimposed upon a heavy and more viscid dark gallbladder bile) in the duodenal tube in several cases. Thus I believe that Premise IV can be sustained.

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[1] In his discussion at Boston in June, 1921, before the Section in Gastroenterology and Proctology of the American Medical Association.

Premise V.—Evidence that cytological, chemical and bacteriological examination of this fluid is both possible and feasible and leads to dependable conclusions regarding gallbladder pathology.

Finally Crohn and his coworkers, as well as Bassler and his associates, attempt to show that in their experience they have not been able to obtain reliable results from the use of the microscope, the chemical or culture tube, and contend that the margin of diagnostic error is too great for the making of reliable deductions.

Comment.—They do not state their methods of examination. Unless their microscopic examinations are carried out within a very few minutes after the mucopus floccules have been recovered so rapid is the destruction of these inflammatory elements, presumably from digestion by pancreatic and gastroduodenal enzymes, that the beautiful cytological pictures so often to be obtained are either completely destroyed or show uninterpretable masses of socalled shadow cells. By preference all specimens should be examined promptly, but if this is not practical, the cytological pictures can be preserved for a few hours by the addition of a small amount of ten per cent. formalin. This, however, interferes with chemical studies. Crohn admits that he did nothing with the bacteriological side of the question. I assume that Bassler has done more, although he did not state his technic. I would suggest that for confirmation of my bacteriological observations they would follow the method outlined previously, and, furthermore, should take into consideration the corroboratory findings of Brown, Smithies, Sidney Simon and Lanford, Friedenwald, Morrison and Charles E. Simon, Whipple and others. I have repeatedly proved the identical cytological evidence as found from aspirated gallbladder samples, and from a biliary fistula and those obtained in the same patient from the duodenal tube, and have repeatedly demonstrated the ability to recover the same bacterial organisms in pure culture in numerous cases from both the operated gallbladder, the postoperative biliary fistula and from the duodenal drainages. In this connection Charles E. Simon says (in his bacteriological discussion of Friedenwald's paper), "Whatever the therapeutic value of nonsurgical drainage of the gallbladder may ultimately prove to be, so much is certain, that as a method of diagnosis the bacteriological study of the bile has already assumed a position which must rank as equal in importance with other standard methods of examination. No search for foci of infection can hereafter be regarded as complete which does not include an examination of the bile." He later states in support of its reliability that, "Of especial interest was one case, an old gallbladder infection, in which Bacillus subtilis was encountered again and again as the only organism which developed on the blood agar plates. At operation the same organism, unaccompanied by any others, was cultured directly from the gallbladder. Following the removal of the gallbladder the bile was found to be sterile on subsequent occasions."

It is perfectly understandable, however, that in certain other cases, in which pus, desquamated epithelial cells, bacteria and inflammatory debris are found in the first part of the B bile, that the gallbladder contents at operation may be sterile and free of abnormal cytology. As has been pointed out, old chronically diseased and once infected gallbladders have been found at operation to be frequently sterile. But this may not be true of the ducts, and infection localized to the cystic and common ducts is frequently responsible for the positive cytological findings when these tubes are flushed out by the discharging gallbladder. It is this residual infection in the ducts that has been the greatest stumbling block of the surgeon and has led to operation and reoperations for gallstone disease (29).

Crohn finally questions the significance of cholesterin crystals found in the bile. I believe that the precipitation of cholesterin or other bile crystals *in vivo*, and when found in specimens of bile freshly delivered and examined is of great diagnostic significance, suggesting a calculus or precalculus forming status, although not necessarily pathognomonic of stones; but I also believe that the precipitation of crystals in vitro "in the icebox," as mentioned by Crohn, is not a proper method of determining the diagnosis, and is beside the case. As this question appeals to me, the formation of calculi is dependent upon at least four factors (recorded here not necessarily in the order of their appearance). First, the precipitation from the bile of substances which should be normally held in solution. These are cholesterin, bile pigments and calcium salts, and possibly other substances, such as leucin, lecithin, tyrosin and amorphous salts. Secondly, stasis of bile, most commonly taking place within the gallbladder, but which may also take place within the ducts, and even within the liver lobules. Thirdly, a catarrhal process in the lining membrane of the gallbladder or ducts provocative to the formation of mucin. These three factors are, doubtless, present either singly or combined at some stage of the initial formation of gallstones. When to these three factors is added infection, the formation of gallstones may be greatly accelerated, although infection may in certain cases be the first stage of the entire process, and by producing catarrhal states of the gallbladder or ducts, may hasten the development of one or the other of the remaining factors. Therefore, the finding of cholesterin or other precipitated crystals, in the absence of one or more of the other factors, does not necessarily mean stone formation has taken place.

It is also evident from a study of gallstones that the formation of most stones is not a continuous process, since the stones are very frequently found impure and are lamellated. The lamellæ have definite chemical compositions, and in this respect the development of gallstones resembles the growth of a pearl. It is possible, then, that if the bile be examined in an interval stage between the laying down of two lamellæ no crystals will be found, although stones may actually be present. The presence or absence of crystals then is not in itself sufficient to prove or disprove the presence of gallstones, but when found and taken as a single bit of evidence, and weighed with the other findings, may be of very definite diagnostic value.

Much more work must be done on the physiological chemistry of the bile. The crystalline supersaturation of biles in connection with certain diseases such as cholesterol in pregnancy must bear close relationship to fundamental conditions of basic metabolism. I hope soon to be able to prove whether this precipitation of crystals is due primarily to their being thrown out from a hyperstatic concentrated bile within a diseased or functionally inhibited gallbladder or ducts alone, or whether the inability to hold these crystals in solution may not go back to inherent defects in damaged liver cells which are no longer capable of secreting a normal bile.

Therefore, I contend that in the foregoing answer to Crohn's criticisms I have shown that he has unwittingly sustained each of the five premises upon which the fundamental principles of this method must rest.

PART IV.

Now let us turn our attention to the criticism of Bassler, Luckett, and Lutz (26), and see how it should be answered. They attack the fundamental principles of the method at its most vital point, namely, that from a review of my writings when examined in the light of their own experiences they assert that I have failed to present conclusive evidence that it is possible to drain the gallbladder, "even partially," as Bassler insists, after the use of magnesium sulphate applied to the duodenal mucosa. And in Bassler's paper he proceeds to analyze the five fundamental reasons which I advanced for my belief that the dark bile obtained after magnesium sulphate is derived from the gallbladder, with the exceptions as I have stated above in connection with dilatation of the ducts and biliary cirrhosis, each of which may and do produce stasis within the excretory channels, and therefore in such cases an abnormally dark bile similar to that stored within the gallbladder may be obtained.

"1. Because I believe that Meltzer's law of contrary innervation as applied to the biliary apparatus is a correct one, and is based upon a sensible interpretation of the most probable mechanism of the physiological storage and discharge of bile." (Lyon.)

Bassler in attacking this first of my five fundamental reasons then proceeds to quote ten operative cases which were examined with the duodenal tube *in situ*, four under his personal observation and six contributed by Luckett, and in his four personal cases says that, "In no instance was it possible to prove any vermicular action on the part of the gallbladder or any visible reason to suggest that any contraction took place, or that the characteristic dark colored bile when obtained was from the gallbladder."

Comment.—From what I have said earlier in regard to anesthesia and injury, it must become apparent that I have not only shown the error of their reasoning, but have made it evident that by these very experiments they substantiate my contention, for, although in four of the six cases cited by Luckett some dark bile was obtained due to an abortive effort of the gallbladder to evacuate its contents, it was not until after manually pressing the gallbladder that the darkest bile was secured. Furthermore, in the light of what I have previously said in regard to anesthesia and possibly surgical trauma acting as agents which would tend to either completely abolish or obtund the normal physiological reflex action of the unstriped muscle of the gallbladder, why should Bassler expect to see any vermicular action or any visible reason to suggest that the gallbladder was attempting to contract. I fully admit that we have as yet no definite evidence (except Sachs' case) as to by what method the gallbladder normally empties its contents, whether it be by vermicular movement or by visible peristaltic wave activities or whether it be by simple collapse as Meltzer conceived would take place when the duct sphincter had been relaxed and bile would be discharging under its normal pressure of something above three hundred to six hundred millimetres of water pressure. Presumably there must be a certain *vis á tergo* acting within the ducts, theoretically represented on the one hand by a contractile power in the gallbladder and on the other hand by various degrees of velocity (or force) of liver excretion.

Again Bassler's contention that this inability to visualize any movement taking place in a gallbladder so obtunded by anesthesia must be reconciled with the case report of Sachs and Simanek (6), and their one or more additional observations. There is no reason whatsoever to doubt the reliability of their observations and it is quite conceivable, as I have already stated, that the visible collapse of the gallbladder ("like that of a balloon when the air is released"), was due to the fact that in their individual cases the neural strength was sufficient to resist the anesthetic dose.

In further attacking my first fundamental reason Bassler goes on to say that "It is a well known fact that with the identical technic in the same individual various findings as to different colored biles are obtained at different times." I admit that this is a perfectly true statement, but Bassler then says, "Also Lyon draws his simile in the action of the gallbladder with the urinary bladder. It must be remembered that the control in the urinary bladder is entirely voluntary, while that in the gallbladder is involuntary." This, too, is also correct, but I should like to ask Bassler why he would always expect that bile, identical in its color and other physical, chemical and microscopical features should always be the same when delivered from the same individual any more than he would expect that the urine delivered from the same urinary bladder must always be of the same color, specific gravity and have no variations in its chemical composition. Such a point of view, on the face of it, is perfectly absurd, and is very far from our present knowledge of normal physiological phenomena. Certainly the urine changes in its color and composition from day to day, often from hour to hour, depending upon the fluid intake, the composition of the foods, as well as due to the nervous mechanism itself, such as will produce a light, straw colored urine of low specific gravity so frequently excreted from a nervous, sedentary brain worker at the end of an intensive morning's work. Is it not equally conceivable that such variations may also apply to gallbladder bile, and may depend upon the duration of its storage, the length of time it has had to concentrate, the volume of lighter liver bile which it receives, perhaps the color of the latter depending likewise upon the chemistry of the food and liquid intake and certain nervous influences which may effect the liver cells and alter the character of their secretions.

A little later on Bassler says, "We are rather of the belief that the gallbladder acts as a buffer or pressure valve to relieve acute distention and protect the pancreatic tissue rather than that its primary function is that of a reservoir of bile for intestinal digestion. This belief is also fortified in that, while the human may live without a gallbladder, nature dilates the ducts after its removal to compensate for this function of the channel system, and until this takes place bile flows more steadily into the duodenum. We therefore believe that there is no evidence to substantiate the belief that instillation of a twenty-five or a thirty-three per cent. solution of magnesium sulphate into the duodenum causes relaxation of the Oddi sphincter or that any contraction of the gallbladder or emptying (even partially) takes place, and therefore the assumption of Meltzer's and Lyon's reasoning seems to be vitiated."

Comment.—By admitting that the gallbladder acts as a buffer Bassler ascribes a definite and important function to the gallbladder which should teach us not to routinely remove the gallbladder unless there is surgically good and sufficient reason for so doing. I agree with Bassler that the gallbladder does act as a buffer and believe such action is due to its concentrating ability to take care of the excess amounts of liver bile which it must receive when the sphincteric excretory control is in a state of contraction. As I have stated above, Rous and McMaster have demonstrated this power of concentration and further state that in the normal range of gallbladder function can receive one quart of liver bile and concentrate it down to a little over three ounces, thus preventing undue distention. When the gallbladder is ablated the ducts try, as Bassler admits, to assume this function by dilating. When Bassler assumes that this buffer action is designed alone to protect pancreatic tissue he presents only an additional theory without furnishing any proof. This may be one element of gallbladder function (I shall not attempt to argue it), but I have theoretically assumed with much more practical evidence of proof, that another important function of the gallbladder is to deliver quickly into the duodenum, when needed for digestion of food, a concentrated amount of liver bile which can be delivered within a few seconds. Therefore I see no proof advanced by Bassler that Meltzer's reasoning or my own has been vitiated.

In attacking my second reason, which lies in the fact that the color and viscosity of this second bile indicates a higher concentration and strongly suggests its coming from its storage chamber within the gallbladder, Bassler in attacking this insists that "this is a very difficult matter to prove in B biles, the specific gravity of which is so changed (elevated) by the magnesium sulphate content, that specific gravity estimations are quite worthless."

Comment.—On this particular point I quite agree with Bassler. Nevertheless, as stated in my answer to Einhorn, I find that testing out the specific gravity in the several biles before stimulation with magnesium sulphate that the darker colored biles usually have a heavier specific gravity than the lighter ones and that the normal range of specific gravity of the darker biles I have found to fall between 1.013 and 1.040. Furthermore, you do not have to depend simply on specific gravity readings to determine the viscosity of the bile. This can be determined, somewhat inaccurately, of course, by shaking the bottle and getting some evidence of its limpidity or its fluidity, just as we can roughly estimate the varying viscosity of several bottles of oil or syrup by shaking them.

Bassler then goes on to say that, "It is not possible to differentiate mucopurulent flakes, pus cells and inflammatory débris, particularly bacteria, as to what part of the biliary tract they come."

Comment.—I ascribe this to either a faulty technic on Bassler's part or to a lack of personal experience in examining such cytology in the light of the comparative histology of the tract. I have partially answered this criticism of Bassler's in one of my earlier replies to Crohn.

A little later Bassler in support of his contention that the darker bile is derivable from the liver and not from the gallbladder, states that, "From our observations and experiments, then, it is suggested to us that the change of color is due to an oxidation process in which ferments or constituents contained in the bile cause the conversion of color, this dark bile coming directly from the liver substance as well as being caused by residence in the ducts or gallbladder when ordinary bile low in oxydase naturally would deepen in color." Bassler and his associates then quote Dunn and Connell's (14) case of hepatoduodenostomy in which the A. B. C. bile sequence was obtained in the absence of the gallbladder and common ducts. This I have admitted might be true in such a case, and have explained it on the grounds of bile stasis within the liver. They go even further to claim a priority of four months from Dunn and Connell in the originality of this happy conception.

Comment.—I maintain that in stating their opinion that the "change of color is due to an oxidation process" that again they are simply exchanging one theory for another, and furnishing no proof. And, furthermore, they are not accounting for Luckett's findings, or those of my own and others, that under surgical observations the deepest color bile is recovered from the gallbladder itself after manually expressing its contents, which I maintain goes much further to support my theory than theirs.

Therefore I contend that Bassler has not shaken the validity of my second fundamental reason.

"My third reason for believing that this second bile is derived largely from the gallbladder lies in the fact that unless we account for it as gallbladder bile we must account for the presence of from one to (in certain cases) nearly six ounces of this darker colored and more concentrated bile as coming from somewhere between the common duct sphincter and the secreting cells of the liver." (Lyon.)

In attacking this reason Bassler quotes Einhorn's papers (*Ibid*) containing his experiments showing that various inorganic salts other than magnesium sulphate will stimulate a quick response of bile secretion into the duodenum, and that Stepp recommended that Witte's peptone be substituted for magnesium sulphate. Incidentally, in this latter connection, you will find that in my paper of October, 1920, submitted for publication several months earlier, I said, "Similarly, the group of antispasmodics, atropine, belladonna and benzyl benzoate, can be investigated, as well as the effect of Witte's peptone or of egg albumin subjected to preliminary artificial digestion, and of various meat extracts and extractives." This I state simply as a matter of record, but it is of absolutely no importance, for Okada (30) in 1914 demonstrated the stimulating effect of peptone solutions on bile secretion by washing the duodenum with this substance.

Bassler then goes on to state his personal experiments with the use of solutions of hydrochloric acid, and says that, "In fact our experience lately has been that for uniformly obtaining the characteristic B bile the instillation of from five to fifty c. c. of a one-half per cent. solution of hydrochloric acid is a far better procedure than the use of magnesium sulphate solution. These facts, therefore, refute the specific action of magnesium sulphate relaxing the sphincter at the papilla of Vater or influencing favorably the innervation of the gallbladder, because it stands as irrefutable reasoning that if any one of a number of substances produces the same result as quickly and sometimes more abundantly than magnesium sulphate, Lyon's third reasoning fails to be convincing. It disproves the belief of Lyon that 'six ounces' as a large quantity must come from the biliary channel as erroneous."

Comment.—I have shown in my answer to Einhorn's criticism that both Einhorn and Bassler are in error when they say that the same result follows the use of these other substances as compared with magnesium sulphate. I unequivocally challenge this statement. Certain of these substances, notably peptone and hydrochloric acid, will produce drainage results more similar to that which follows the use of magnesium sulphate, but by no means so effective in the long run of cases. An occasional case may be met with, no doubt, in which a fairly good drainage of the gallbladder can be accomplished by either of these two substances, but it is to be remembered that solutions of peptone may represent the normal physiological stimulus to gallbladder evacuation, and that hydrochloric acid as partly representative of the gastric juice may alone produce some evacuation of gallbladder bile although its action will be greatly enhanced if it has first acted upon proteins to convert them into peptones. Pharmacologically, the medicinal use of nitrohydrochloric acid has been long known and quite favorably known as a drug possessing a cholagogic action, but it, as well as hydrochloric acid, acts chiefly to stimulate a flow of bile from the liver through the hormonic influence of secretin converted from prosecretin by the hydrochloric acid. I maintain that while hydrochloric acid may perhaps act better as a hepatic secretogogue than does magnesium sulphate and perhaps may deliver a larger expression of liver bile, it does not lend itself so well to evacuating the gallbladder. I therefore maintain that neither Bassler, nor any one else, has thus far brought forth any theory or experiment to invalidate my third fundamental reason.

In closing his attack on this third premise of mine, Bassler concludes his arguments by saying, "We therefore believe that if the obtaining of bile in quantities is an important point in a therapeutic way, and this bile possesses all the characteristics of that obtained from an instillation of magnesium sulphate solution, the use of a weak solution of hydrochloric acid is a far better means to obtain a large quantity than magnesium sulphate."

Comment.—As I have stated above, this bile does not possess all of the characteristics of that obtained from an instillation of magnesium sulphate solution. In fact, quite the contrary. But if Bassler is attempting to go on record as the originator of the use of hydrochloric acid as an aid in medical drainage of the liver I would point out to him that seven years ago Okada (*Ibid*) found that the same abundant flow of bile followed lavage of the duodenal mucosa with dilute hydrochloric acid.

"4. My fourth reason, and I feel it is the strongest, for believing that this second type of darker yellow and more viscid bile is actually coming in large part from the gallbladder, lies in this (I think) convincing fact—namely, that in the cholecystectomized patients that I have studied postoperatively, some ten or more cases, I find, A, that I never recover the second type of dark bile but pass immediately from the light golden yellow or relatively more concentrated common duct bile to the light lemon yellow and limpid bile that I believe is freshly secreted liver bile and collectable for long periods as rapidly as it is secreted, and B, I find that (in this cholecystectomized group) in the larger number of instances, bile is continuously entering the duodenum in the fasting stomach and duodenal state, indicating that the duct sphincter is in a state of inhibited tonus, probably permanently so, since the antagonistic or contrary innervation has been cut when the gallbladder was removed." (Lyon.)

In quoting my fourth reason I beg to call attention to the fact that Bassler, whether intentionally or otherwise, has failed to quote it correctly by omitting reference to a foot note over the word "bile" in the sentence reading, "I never recover the second type of dark bile" (in cholecystectomized patients). By referring to this footnote, it will be found to read as follows, "It is conceivable that in cases in which the gallbladder has been removed and in which the ducts remain infected and the common duct becomes secondarily obstructed, that in such cases dark inspissated or static bile may be recoverable."

Bassler then attacks this reason by stating that, "Characteristic B biles are not only obtained from the vast majority of cholecystectomized individuals, but also from those not yet out of bed from the operation before the ducts have had a chance to dilate to take up a gallbladder function."

Comment.—I challenge this statement that the vast majority of cholecystectomized patients will deliver the typical B bile seen in the average noncholecystectomized patient. In my experience it has been the exceptional case which shows this and, as I have stated above, occurs most commonly in such cases as present clinical or operative evidence of dilatation or partial obstruction within the common duct which leads to damming up of static bile within the liver, as occurs in various grades of biliary congestion or cirrhosis. That Bassler has observed the recovery of darker colored biles from such operated cases when tested one or more weeks after their operation, or before sufficient time had elapsed to conceivably cause duct dilatation, I admit is a true statement, for I have seen it myself. But there are two reasons to account for this. One is in the well known fact that in observing the bile being drained from the surgical drainage tube of the operated patient, whether from a cholecystostomy or choledochostomy, we see for the first few days, to a week or even longer, that the bile being drained is of a darker color persisting sometimes even after the discoloration caused by blood admixture within the bile as an immediate result of surgery. This dark colored bile may be a reaction on the part of the liver as a result of the toxic effects of the anesthetic, just as the scantier postoperative urines show a higher color due to increased concentration. After this toxic effect wears off the bile coloring will gradually lighten and approximate more the normal color of liver bile. Secondly, in many of the operative cases so cholectomized the patient is very frequently in a state of jaundice, which, of itself, indicates biliary obstruction with stasis within the liver lobules and therefore the dark bile, as I have already contended, could be coming from this source.

Finally, in this paragraph Bassler mentions the fact that in cases of achylia gastrica a better gallbladder evacuation is obtained from the use of hydrochloric acid than from magnesium sulphate. I also challenge this statement, for I have found that some of the deepest, blackest biles that I have seen recoverable with magnesium sulphate have occurred in cases of achylia gastrica.

Therefore I maintain that Bassler has failed to successfully sustain his attack on my fourth fundamental reason.

"5. I might add a fifth reason, to the effect that in my postoperative group of cholecystectomized patients upon whom this nonsurgical method has been practised (because the length of time over which surgical drainage could be maintained has not been sufficient to allay the catarrhal inflammation or to arrest the infection), that is in this group, together with a group of nonoperated patients with cholecystitis or with gallbladder biliary stasis, I have seen this second type bile, easily demonstrable as pathological, gradually clear up and return to a more normal appearance under biweekly drainage by this method." (Lyon.)

Bassler naïvely states that, "This, it occurs to us, is entirely a happy assumption and will remain so until it is proved that the socalled B bile is derived from the gallbladder, which in our belief has not been done."

Comment.—This observation requires no further substantiation beyond what I have already given, but at this point I might say that both Bassler's concluding pages, as well as the concluding paragraphs of Crohn, which deal with their failure to obtain therapeutic results from this method, is, I believe, due to several factors; possibly a faulty therapeutic plan of management as regards the frequency and total number of drainages required in any individual case; perhaps an injudicious selection of the type of patients which this method can unquestionably help, and, in many cases, apparently cure; and to a failure to comprehensively ascertain all factors which enter into the patient's general conditions of ill health and consequent failure to make the treatment comprehensive enough to control the collateral or contributory states of dysfunction or disease. Both of these critics have been woefully lacking in their bacteriological studies of their cases, and in their failure to make use of the help to be obtained by autogenous vaccines.

Before I turn finally to a review of Bassler's conclusions, I would like to take up just a moment longer in supporting my contention that this method of using magnesium sulphate as first suggested by Meltzer does serve to evacuate the gallbladder, partly or wholly, of its fluid contents and in certain instances of its solid concrements, by asking these critics the following questions:

If B bile, with the exceptions to which I have alluded, is not being derived from the gallbladder, how else can we so well account for our recovery of small gallstones or gall sand directly through the tube, or our recovery of larger gallstones found in the sieved stool of patients who have recently had a duodenobiliary drainage? Are they all coming from the ducts or liver? How else can we account for our recovery of large quantities of practically pure pus in several of our proved cases of operated empyema of the gallbladder? Is it all coming from the ducts or liver? How else can we so well account for the reproduction of gallbladder pain, either of a definite colic type, or a sense of upper right quadrant soreness or of infrascapular pain following certain of our drainages in cases with definitely inflamed, infected or lithic gallbladder? How else can we account for the recovery of identical microscopical cytology in our supposedly gallbladder specimens of bile with that recovered directly from the gallbladder at operation or by direct aspiration of bile through persistent biliary fistulæ in certain of our sinus cases in whom we have had repeated opportunities to check up on this point? How else can we so well account for the nonoperative relief of our cases of acute typhoid cholecystitis, or for not only the symptomatic recovery, often brilliant, if not of actual cure, of a very large series of patients after a course of medical biliary drainage, but also for the coincident improvement in, or the final disappearance of, the pathological, microscopical and cultural findings in such patients? Finally, I should like to ask Einhorn and Bassler that if they contend that the dark colored bile is derivable from the liver and not from the gallbladder why is it that they (or we) do not obtain it in all cases and especially with those solutions that are hepatic secretogogues rather than gallbladder evacuants?

I should like to be permitted again to point out that this method is not and was never intended to be a cure all for all types of gall tract disease. It has limitations as to the selection of cases in which it should be used, and I find that primarily these patients fall into a fundamental first group in whom we must prove by a diagnostic drainage that we can secure the deep colored bile resident within the gallbladder and not due to other states within the ducts or liver, in other words that we can actually drain the gallbladder as well as the liver and the ducts.

Having made this fundamental classification of this group, the cases to be treated by this method may include the states of early gallbladder catarrh or infection, and the states of atony, and indeed certain states of well advanced pathology, but which occur in patients who show marked surgical contraindications in liver, kidney or other vital systems and in whom this method can then be practised as an alternative plan, as a temporary procedure with the hope to so reduce the toxemia as to make later operation a safer procedure; and finally, as a followup postsurgical measure to continue to medically drain the residual infection left in the ducts or liver, a state which so frequently occurs after a cholecystectomy has been performed.

There remains nothing further for me to discuss in Bassler's paper except the conclusions which he has drawn. Under ordinary circumstances I would not care to criticise any one's conclusions, especially when they are based upon such a carefully prepared study as Bassler and his associates have presented. But I feel that the occasion warrants it, inasmuch as they have attacked so vigorously each of the underlying fundamental conceptions upon which the method of medical drainage of the galltract is based. Nor would I necessarily do so even then were it not for the fact that I most heartily and earnestly believe not only in the soundness of the principles of this method but also believe that it possesses so much usefulness in the detection of and in the alleviation of, if not in the cure, of gall tract disease, that I feel that a responsibility more than ever rests upon me to defend its value. I will append Bassler's nine conclusions with brief comments on each.

"1. The assumption of Meltzer of 'the law of contrary innervation' is not proved, and this throws into doubt any specific effect of relaxation of the sphincter of Oddi and contraction of the gallbladder induced by a magnesium sulphate solution."

Comment.—I concede that in its broad aspects Meltzer's law of contrary innervation is not definitely proved. But it is theoretically so sound and so much better than any other theory that has yet been advanced to explain the probable mechanism of the filling and emptying of the biliary tract that I believe that it will be ultimately proved to be correct. I do deny, however, that Bassler has presented any evidence which could tend to throw doubt upon the specific effect that magnesium sulphate possesses in its power to relax Oddi's sphincter and to cause an evacuation of the contents of the gallbladder, although I admit that the exact manner in which the gallbladder actually empties itself still remains a matter of speculation.

"2. Any one of many substances taken into the stomach or injected into the duodenum will cause a ready flow of bile, of which a solution of hydrochloric acid in about one third the acidity of normal gastric juice is the most potent for discharge of bile in large quantities and obtaining characteristic B bile."

Comment.—I admit that any one of the substances mentioned in this paper when injected into the duodenum will cause a ready flow of bile in most cases, but will do so in varying degrees. Some will undoubtedly relax Oddi's sphincter more quickly and more regularly than will others but I deny that any of them, with the exception of magnesium sulphate, peptone solutions and solutions of hydrochloric acid has any power to evacuate the contents of the gallbladder, except in negligible quantities, and that as regards their efficiency in this respect these substances can be placed in the order in which I have named them, and of the three magnesium sulphate is by far the most efficient and reliable chemical to use for this purpose.

"3. That the deeper color of B bile is due to oxidation and not concentration from retention in the gallbladder, this bile most often coming directly from the liver as a phenomenon of bile secretion."

Comment.—I maintain that this conclusion of Bassler's simply represents the presentation of another theory as to the origin of the deeper colored B bile and yet fails to present any supportive proof for this theory. I furthermore contend that he himself, entirely independent of what I have said of my own work, has advanced greater proof of my theory that, with certain very limited exceptions, the deeper colored B biles are derivable wholly or in part from the gallbladder.

"4. That the viscosity of bile does not elevate its specific gravity to any practical extent."

Comment.—I can only affirm that in my studies in regard to the specific gravity of the several biles recovered from the galltract, that in the comparatively rare exceptions in which we find a true A, B, C sequence without the use of magnesium sulphate or any other chemical or any other stimulant, beside what may be coming from the acid gastric juice delivered from the patient's own stomach, that I find that the specific gravity of the darker colored biles has a higher range than the lighter colored ones; that of the B biles which I have studied the specific gravity variation in health and disease varies between 1.013 and 1.040; that apparently the bile is normally an acid fluid; and that the higher degrees of acidity are found in the deeper colored biles.

"5. That the margin of error in deducting from the presence of mucopurulent flakes, pus cells, inflammatory debris, bacteria and cells in the aspirated bile as positively coming from the gallbladder is too great for clinical deduction."

Comment.—I admit that there is a certain and variable margin of error in making such deductions. I believe, however, that this margin of error must be very similar to that which was asserted shortly after the method of microscopically studying the cytology from specimens of urine was introduced. Nevertheless, as time has gone on much progress has been made in this respect, so that he is a very poorly trained fourth year medical student who is not definitely able to discriminate between vaginal epithelium, urethral epithelium and bladder epithelium and who would make any mistake of interpretation that hyaline, waxy or granular casts are coming from the urethra instead of from the kidney. So I maintain that if the doctor of today or the medical student of tomorrow will assiduously apply himself to the microscopic study of bile that he will learn to differentiate the usual types of oval or cuboidal duodenal epithelium, usually unbile stained, from the heavily bile stained columnar epithelium from the bile ducts or gallbladder, and will be able to make certain reliable deductions as to the source of pus cells, various strands of mucus, and even the probable origin of the bacterial evidence (colonies, etc.). I might discuss this at great length, but I will refer you to the more elaborate consideration of this topic contained in a book soon to be published.

"6. That the physiology of the gallbladder should not be deduced from anatomy and relationship alone —that its most important function seems to be to relieve pressure within the biliary system to protect the pancreas rather than acting as a reservoir for bile in a digestive sense, and that the physiology of bile secretion and gallbladder function should be studied more thoroughly."

Comment.—I am entirely in accord with the first two lines and the last two lines of this conclusion, but I maintain that the balance of it is merely substituting one theory for another without advancing any proof.

"7. That cholecystectomized individuals show the characteristic B bile even shortly after operation before the ducts have had a chance to dilate. This occurs so commonly that B biles cannot always be from the gallbladder."

Comment.—I have admitted the validity of the first sentence, and I admit, too, that B biles cannot always (note my exceptions) be from the gallbladder, but I maintain that from the remarks which I have made above that I have disproved the soundness of this conclusion.

"8. The increase in specific gravity in aspirated bile by this method is due to the content of magnesium sulphate, which appears to be resorbed into the portal circulation and is excreted by the liver substance in the bile. It is erroneous to deduce clinically in both amount of biles obtained of any gradation (A, B, C, D) or by specific gravity estimations as to whether bile stasis exists or not."

Comment.—I have admitted the validity of the first sentence and have given my reasons both to Einhorn and to Bassler as to why I agree with Bassler that the practice of this method does not permit us to make any accurate deductions as to the state of the gallbladder. I deny, however, that it is erroneous to deduce clinically certain diagnostic inferences as to whether bile stasis exists or not and where it exists.

"9. That where a true pathological condition exists in the gallbladder the method is a poor substitute for proper surgery. It may be employed in suitable cases as a temporizing means, but it should not be depended upon to correct or definitely benefit pathologically diseased gallbladders or when gallstones exist."

Comment.—I am only in partial agreement with this one and final conclusion of Bassler's. As I have stated, I have never advanced this method as a cure all for all galltract disease nor do I ever expect to see it so developed as to exceed its natural limitations. I do, however, maintain that it is the method of choice for the treatment of early states of gallbladder catarrh, infection and disturbances of function; that it will be applicable to many truly diseased but early states which are unrecognizable and are passed over by the trained surgical eye and touch, and yet, nevertheless, harbor pathogenic factors which, if not recognized and treated at this stage, will inevitably tend to progress to well developed pathological alterations in gallbladder, ducts and neighborhood viscera that will later require surgical interference for their correction. I also maintain that it has already been proved to be an alternative method of treatment for use in cases which show grave surgical contraindications; and, finally, that it is a useful method, and will ultimately be widely adopted in the postsurgical management of cholecystostomized and cholecystectomized patients in order to rid them of residual catarrh or infection in gallbladder or ducts and thus aid us in preventing the necessity of so frequent reoperations on the galltract.

In conclusion, I may say that so far in an already large and rapidly growing series of cases, many of the patients gravely ill and many of them far from cured after repeated applications of surgical methods, I have seen comparatively few cases which have not been in a great degree distinctly benefited and many cured by the application of this method and with absolutely no mortality. In this respect alone I predict that the future of this method will become even more brilliantly recognized.

What the ultimate proof or disproof of the validity of the soundness of this method will be, or where it may come from, I dare not hazard a prediction. It would be most extraordinary if any new method, particularly one so revolutionary to modern concepts as is this one, should be ultimately found to be correct in every detail of its original postulates. Nevertheless, I believe that the more thoughtful medical public who will take time to digest this argumentative discussion will agree with me that up to the present the fundamental platform upon which this method rests has not been shaken.

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A complete list of references will appear in the author's reprints of this article.

Causes of the Loss of Vitreous Humor, Prolapse of Iris, and Subsequent Membrane Formation in Cataract Extractions

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It may be affirmed that the simple operation for cataract is abandoned for the preliminary iridectomy by many operators on account of too frequent prolapse of the iris following extraction. Others abandon the simple extraction actuated by fear of cutting the iris; while many who do not fear cutting the iris in some cases do the combined operation. The simple, combined, and preliminary operations are all done in the Major Smith and Homer Smith operations. The Kalt operation differs from simple extraction only in the stitching of the corneal flap to prevent prolapse of the iris.

Operators, no doubt, are prone to abandon one operation for another which they may believe to be safer because of the risk of the vitreous humor escaping. Without having access to statistics, I offer an opinion, based on operations seen and a review of the literature, that the greater proportion of loss of virteous, according to operations named, is in the following order: Major Smith, combined, preliminary, Kalt, Homer Smith and simple. Although I have not seen the Homer Smith operation performed, I regard it as the safest for two reasons; there is less effort expended in getting out the soft cortical and all danger is obviated of losing vitreous while cutting the capsule.

Looked at from another viewpoint, the simple operation has the advantage of there being only one chance of infection from operation. The Homer Smith operation is divided, and if a preliminary iridectomy is done, there are three chances of infection. Besides, if the lens should be much swollen, the section would have to be made through a shallow anterior chamber, which would make it more difficult to avoid cutting the iris.

The Kalt operation differs from the simple only in the stitching of the corneal flap. This takes more time which always increases the danger of loss of vitreous humor, especially if the manipulation be faulty or the patient nervous or unruly. The extraction after preliminary iridectomy is more apt to cause loss of vitreous humor than the three mentioned, because the ligament is often ruptured at the time of the iridectomy. In the combined operation, the ligament is more likely to be ruptured at the time of the iridectomy than in the preliminary, because of less support against the pressure from within on account of a larger opening. There are so many steps in the combined operation that if the ligament is ruptured at the time of the iridectomy, and the vitreous humor does not precede the lens, it is exposed and may escape while cutting the capsule, during extraction of the lens, removal of fixation forceps, or speculum, or in straightening out the corners of the flap.

Many writers on the Major Smith operation tell the hard luck story of too frequent loss of vitreous. The escape of vitreous is generally a result of having to rupture the ligament in order to extract in capsule. The improvements in this operation that have been recently reported should make it more popular, as it is certainly the ideal operation if loss of vitreous can be avoided.

FAULTY TECHNIC.

I will now attempt to point out the causes of loss of vitreous. In the beginning the patient is requested to look in different directions, to determine if he is nervous, or if the nerves are under control, so that there may be no difficulty in having the patient look down when ready for the operation. This may disturb a patient who is not nervous, or increase the nervousness of one who is nervous. This may be immaterial, but it is like reining up a horse when the rider fears he may be frightened; when the horse sees the rider has fears, he is more apt to shy.

After the speculum is placed, the conjunctiva is grasped with forceps below the cornea, held with the operating hand, and turned over to the other hand after fixing. The patient is then requested to look down, and if he fails to do so, may be spoken to in a stronger tone of voice the second time. If the eye is not turned down sufficiently, the fixation forceps may be brought into play. The knife in hand, the point enters the cornea at limbus practically vertical to the surface of the cornea, to avoid splitting the cornea, as is said. This way of entering the cornea is almost invariably done with the fingers held in a more or less cramped position and too near the blade, with the handle resting on the middle and ring fingers. After the point has entered the anterior chamber, the blade is turned to the horizontal plane. In doing this the experienced operator shifts the fingers further back and rests the handle on the first and middle fingers, while an inexperienced operator may not see the mistake until it is too late to recover. This recovery is often not complete, which causes the counterpuncture to be made too deep. If the iris is not cut, the cutting is made too deeply on the nasal side to the finish. This makes hard cutting with the sharpest knife, and consequently more pressure with the fixation forceps to hold the eye against the hard cutting, which is apt to rupture the ligament.

If the counterpuncture is made correctly, and the entire cut is made along the limbus, there are other dangers to the ligament:

1. When the face of the cornea and iris is turned from the operator's eye, the cut is likely to be made too deep on the finish, either a complete iridectomy or buttonhole in the iris near the finish. This also makes the cutting harder, which may rupture the ligament.

2. While the eye is in the downward position and held so by the fixation forceps (often too much pressure) there is an increased pressure above from within, which makes the iris come forward above.

This also endangers the iris and is a strain on the ligament.

3. The anterior chamber is also made less deep by pushing too strongly on the forceps, which may flatten out the cornea to some extent in the vertical axis. This is shown more particularly when the anterior chamber is empty, before the cut is finished, and the cornea is drawn in folds running vertically.

4. The capsule is cut while the eye is still in the downward position, on account of increased pressure above from within, without any resistance from without, as the cut stands more open while the eye is turned downwards, the ligament is apt to give way if not already so in any of the other steps prior to this. Vitreous is often lost while the capsule is being cut.

5. Returning to the fixation forceps, instead of unfixing with the hand holding it, the forceps are held up vertically and turned over to the other hand, which has first to get rid of the cystotome by either laying it down or handing it to an assistant. As the operator's eye is away from the operated eye at the time, and the ligament broken, vitreous is sometimes lost before the hand can get rid of the cystotome and come to the relief of the hand waiting for assistance. The assisting hand takes hold of the forceps above the holding hand. Both hands now have hold of the forceps covering the eye so that it cannot be seen by the operator, as he is standing behind the patient, the hands being brought over from that direction. In holding the forceps with both hands vertically, the manipulation with the two hands on one instrument cannot possibly be as delicately done since it results in more pressure on the eyeball. The writer has seen vitreous lost while the two hands covered the eye, the operator being unaware of it until the forceps had been removed.

We now come to the most dangerous part, so far as the vitreous is concerned—extraction of the cataract. To me the mistake here is hardly less pardonable than the placing of two hands on the forceps. With the counter spoon above, the horn spoon is placed on the flat against the lower part of the cornea, with the lower edge directed toward the free margin of the lower lid. The operator begins pressure with the flat of the spoon, which is directly over the lower part of the lens; when this fails to start the lens, as a second thought, the lower edge of the spoon is slightly tipped in toward the lower border of the cornea. The pressure then is partly with the flat and partly with the lower edge. The fact of the matter is, the first attempt presses against the lower part of the lens in the direction of the centre of the eye, driving the lens more inward than upward. The slight tip of the lower edge of the spoon toward the eye brings the partly turned edge under the lower edge of the lens, which starts the lens forward, though with still too much pressure to make it safe for the eye, as the pressure is still partly against the lens in the wrong direction. This pressure, with the eye turned downward, the increased pressure above from within, and the wound gaping as a fish's gill when the head is turned in the opposite direction, is enough to break the ligament and lose the vitreous at the same time.

The lens and speculum removed, with no vitreous lost, danger is not yet passed. The operator, standing in the same position behind the patient, dresses the wound, using his iris repositor to straighten out the angles of the cut and lifting the upper lid with his finger. If the patient has been good through the whole operation, he is likely to resist the raising of the lid from the brow. I have seen vitreous lost twice recently in this way.

Prolapse of the iris comes from the same manipulation which causes the loss of vitreous. If the operation is completed without the loss of vitreous, under the conditions which would cause it, the corneal flap does not lie down smoothly and the iris shows an inclination to prolapse, and there is almost surely a prolapse at the first dressing, usually two days later.

If the extraction, on the other hand, has been made without any mistakes, and the eye carefully bandaged, there will be no prolapse two days later when the eye is dressed the first time after leaving the operating room. At this first dressing the patient is made to look downward, which, of course, causes the upper lid to move down. In order to see that the iris is in place, the upper lid is raised with a finger, the operator usually standing behind the patient, which necessitates raising the lid higher in order to see from behind, and the eye is closed with a feeling of satisfaction that the iris is in place. At the second dressing, which is the next day, a prolapse is almost sure to be found. This, of course, is a surprise and a disappointment to the operator, who wonders how it could have happened. The writer watched these first and second dressings in the days of the simple extractions, and made the first dressing, in his cases, on the fourth day, with the result of no prolapse or infection because union had taken place. After coming to the conclusion that the prolapse was caused by making the patient look downward while pulling up the upper lid in order to see the wound, I have since dressed my cases on the second day without danger of prolapse.

It is not intended in this paper to include unruly patients or those who may cause a prolapse of iris by violent coughing, but to speak only of the part played by the surgeon.

Secondary membranes are caused by remains of soft cortical and parts of overripe cataract and stroking the iris to replace it, which is done gently by some, less so by others. Iritis may occur in either case, but is more likely to occur in those roughly handled. Iritis is common with iridectomy, and more likely to occur if there has been too much pulling on the iris before it is cut.

The speculums in general use play a serious part in the loss of vitreous. They are made either round or square, and can easily be pressed down against the eyeball by the lids. To make them more objectionable there is a spring, which opens the lids too widely for comfort. The patient may stand the strain a while, and suddenly, instinctively, attempt to release the lids by closing down on the speculum. If the patient attempts this, he will go to the limit of the strength of the orbicularis muscle; the same as a horse does in pulling against a severe bridle bit.

Several years ago I devised a speculum with the arms made on the flat like a knife blade which could not be bent. Some years later a further modification was made, the spring being left off and the fastening changed to a threaded bar attached to one arm and passing through a hole in the other arm. By this means the speculum could be made to open and close by a threaded tap backwards and forwards on the bar. In this way the lids are not opened out beyond the limit of comfort. With this modification no patient has ever attempted to squeeze on the speculum; should he do so it can be released in a second, and at the same time the speculum collapses, which leaves nothing for the lids to press against. The spring speculum can be released as speedily, perhaps, but instead of collapsing the spring opens the lids wider, unless held, while the eye with the collapesd speculum is out of danger. Vitreous is often lost before the spring speculum can be removed from under the lids after it is unfastened.

My technic to eliminate the loss of vitreous and prolapse of the iris may be used in all the methods of cataract extractions; but as I wish to defend the simple extraction operation and its aftertreatment, this operation will be taken to cover all points—the right eye is selected to make explanation easier.

THE TECHNIC.

Patients are not spoken to except to let them know that you are present. That is, they are not drilled as to what they should or should not do. The eye, thoroughly under cocaine, the face and eye are made sterile; wet bichloride towel around the face and head; speculum placed under the lids, with care not to open the lids uncomfortably wide. The fixation forceps are taken in the left hand, with the spring catch on the thumb side of the hand so that the thumb can reach the catch when ready to be removed. The eye is directed vertically and must not be pressed down any more than is possible to steady it. The knife is placed on the first and middle fingers far forward, so that the knife may be passed across without having to shift the fingers. With the fingers practically straight, the thumb is placed on the handle, and the knife is brought up to the limbus on the horizontal plane. Before entering the cornea at the limbus lower the handle slightly so that, when the point of the knife passes through the anterior chamber, the point is slightly higher than the handle. The point is lowered to the horizontal plane after it passes the dilated pupil, so that it will come in contact with the limbus. This shows that you are not gripping the handle, which invariably turns down the point and comes out below the limbus. While the point is at the limbus ready to make the counterpuncture, make sure that the point is not low enough to engage the conjunctiva, because it handicaps the first upward and forward stroke, and may throw the stroke below the limbus, besides slowing up the stroke and endangering the iris. So it is better to make the counterpuncture above the limbus than to engage the conjunctiva as the upward-forward stroke brings the blade into the limbus. For this reason it is better to have the point slightly raised as it passes across.

The next stroke is backwards and upwards. These two strokes nearly complete the section, which brings one out of danger of cutting the iris, so long as the edge is not turned downward at the finish. The strokes at the finish are short. The knife is passed along the line of the limbus, except perhaps the counterpuncture may be higher. The cut is finished with a conjunctival flap of about an eighth of an inch. The forceps are removed in less than a second by touching the catch with the thumb. The springless speculum is released nearly as quickly, as the forceps are removed. If we can say that there has been the slightest danger so far, we can equally say that this slight danger has passed.

The cystotome is taken in the right hand and the counter spoon in the left. The spoon is placed exactly in the position as in the cataract extraction; the handle across the nose, in the left hand on the eyeball just above the cut. The free margin of the lids is just as thoroughly cocainized as the eyeball, and the patient does not feel the counter spoon. The spoon does not leave its contact with the eyeball in its passage upward against the free margin of the upper lid. In this way the lid is raised out of the way without the patient being aware that the lid is being raised. The cystotome is passed in from the temporal side at the temporal angle of the section. The capsule is cut; the cystotome is removed and put aside for the horn spoon. While this change is being made, the counter spoon may remain holding up the lid, or be removed until the horn spoon is in hand. As the counter spoon again holds up the upper lid, the horn spoon is placed on the flat against the free margin of the lower lid, while the edge is against the lower margin of the cornea. As soon as the slightest pressure is made the lens is tipped forward above; the lens comes out easily and quickly without the slightest strain on the ligament. If there should be soft cortical remaining, it can easily be removed with the two spoons in the same position as in removing the cataract, except that the horn spoon may have to follow up the soft lens matter as it comes forward. If the soft cortical matter cannot be removed entirely in this way, the horn spoon is changed for the pipette with a normal salt solution.

There is not the slightest trouble in passing the point of the pipette from the temporal side under the conjunctival flap and just in the lips of the corneal part of the section. At no time has the iris been touched and at no time have the hands touched the eyelids or even the face. If no soft lens matter is visible, the patient is asked to close his eyes, and after the lapse of a minute or two he is asked to open them. The pupil will be found small and round. If it has not returned in place, more time may be given; and if it does not return round, we may be sure it is held by remains of lens matter, which is then removed. It is then given a few minutes with the eye closed. The iris back in place, the conjunctival flap easily places itself; if not, it is stroked upward with the iris repositor under the upper lid as you stand in front of the patient, with no touching of the lid with any other instrument, or the hand. Iridectomy can be done if necessary by the spoon holding the lid and the assistant cutting as the forceps draws the iris forward with your right hand. A drop of atropine and argyrol is instilled and the eye then bandaged. A safety pin is used to fasten the bandage together over and under the ears, so there will be no slipping of bandage over the back part of the head, as is often the case.

At the first dressing, two days later, the patient's whole face is washed with cotton soaked in boric acid solution, care being used to wash the lids and along the lashes to remove any mucus that may be pasting the lids together. The patient is then requested to open both eyes without moving them in any direction, and by all means to avoid looking down. Before, or while dropping in atropine solution, there can be seen the anterior chamber refilled, a clear cornea, and the lower part of a dilated pupil. Solution of argyrol is then dropped in and the eyes are closed and bandaged.

If the anterior chamber is found to be empty, it is likely to be the result of a prolapsed iris, leakage being caused thereby. So, in either case, we can determine whether or not there is a prolapse, so why should we let our curiosity cause us to investigate the wound and get a prolapse to be discovered at the next dressing?

The object of looking at the wound is twofold—the one mentioned, and the other to ascertain if there has been any infection. I have never seen a case of infection that did not give evidence as soon as the eye was opened. The evidence is usually seen first on the dressing, next on the edges of the lids, and still more evidence when the lids are opened, the anterior chamber fluid not clear, and perhaps the cornea becoming hazy. Why should the wound be inspected if there is no indication either of prolapse or infection from an inspection of the cornea and anterior chamber, below where the section has been made? If it is evident that there is a prolapse, it is likely to be let alone if the eye is quiet and there is no pain. Nothing would, therefore, be gained by looking at the prolapse, and, on the other hand, it is apt to open the wound wider and produce a larger prolapse. It may be decided by indications to do an iridectomy; if so, the prolapse may be first examined. If infection is evident from the indications pointed out above, the wound or source of infection should be examined, as something would have to be done quickly to the infected source. Tincture of iodine in the anterior chambers checked two infected cases. No other cases since then have been infected.

Advantages of the conjunctival flap are at least four, the most important being that a prolapsed iris will return to a normal round pupil. I have had three prolapses which all returned to normal, two returning in about three weeks, while the third showed no signs of returning at the end of six weeks, but when seen a week or two later the pupil was round. The only explanation I can offer is that the iris does not bunch up under the conjunctiva, but instead lays out flat and has no union with the cornea or conjunctiva. The iris cannot reach to the top of the flap, which heals above and around it. The space it is contained in is practically a part of the anterior chamber. In the corneal flap operation the iris is bunched up in a hernia form. A union of the cornea around this small neck in the hernia part chokes it off so that it cannot return.

If the eye is not infected at the time of the operation, the anterior chamber is well protected against infection. The conjunctival flap operation does not produce astigmatism, and leaves no corneal scar line to show that there has been a cataract extraction.

I understand that pupilary membranes are the result of a mild or severe iritis. This iritis usually comes from bruising the iris. The grade of inflammation accompanying the iritis will depend largely on any injury that has been done to the iris in operating. The extent of this depends largely on the operator; some cause less traumatism than others in doing an iridectomy; again some do more stroking of the iris with the iris repositor than others. Too deep a section may result to a bruise to the iris by the knife being dragged across it. Many of these pupillary membranes will disappear if left alone until the eye gets entirely well, that is, in six weeks or two months. One of the reasons why patients may have to be needled more than once is that they have been needled before leaving the hospital when the inflammatory process was still going on, and the membrane has formed again. Another reason for needling more than once is failure on the part of the operator to cut the membrane. The use of a straight knife needle is often responsible for this failure to divide the membrane. The needle penetrates the membrane but, being too short to permit of moving the blade up and down, the blade is brought forward against the membrane, which is so elastic that it recedes from the blade to the edge of the iris. When the knife is removed, the membrane falls back in place uncut.

After witnessing so many failures several years ago I devised a knife with a blade set at an angle of thirty degrees from the shank and handle. As the handle is held in the hand at an angle of about thirty degrees, the blade would lie on the horizontal plane. The point turned from the operator as it enters the anterior chamber when passed over the dilated pupil, a quarter turn toward the operator brings the cutting edge on the horizontal plane against the membrane, without the point entering it. A slight pressure and drawing the blade across the membrane at the same time will not fail to pierce it. I desire to emphasize the importance of not bruising the iris. This is possible by doing simple extraction.

The foregoing discussion may be closed by mention of a case of simple extraction by another, with my assistance, followed by three or four needlings. The fact that the needlings were failures demonstrated the importance of not needling too early. As the patient was getting along in years, he was advised by his doctor to let his family do his reading for him. His best vision, with or without glasses, was 2/200. About two months later he sent for me to come and see him. The ophthalmoscope showed no membrane; and with a pocket lens he read fine print easily in his newspaper. He was advised to be fitted for glasses, but hesitated, out of respect for the doctor's advice. He was told that the doctor would be pleased to know that his eye was in better condition. That day he returned to the office, and the glass correction gave him 20/20 vision. My early experience in this case was a lesson that served me well in many others.

The External Function of the Pancreas and Its Bearing on the Surgery of the Pancreas*

By JOHN J. GILBRIDE, A. M., M. D.,
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The pancreas has two definite and distinct functions, i. e., an internal function, secretion into the blood; an external function, secretion into the duodenum. The internal function is concerned with glucose and endocrine action. The external function deals with the digestion of the foods in the intestine, and it is doubtless of much value when absorbed into the blood with the products of digestion.

The amount of pancreatic juice secreted varies with the quantity and character of the food intake, and it is said to be about 1,500 c. c. a day. Pawlow (1) in his wonderful little book gives the results of his experiments. He introduced 250 c. c. of five tenths per cent. hydrochloric acid into the stomach of a dog which had a pancreatic fistula. In a few minutes the flow of pancreatic juice increased from one or two drops a minute to thirteen or fifteen drops a minute. He then introduced a solution of lime water into the stomach with the result that after a few minutes the pancreatic secretion became less and less until finally it almost ceased. Here we have another very important principle of practical value. Acids increase the pancreatic flow, and alkalies diminish it. Pawlow pointed out that dilute hydrochloric acid in the duodenum did not excite the secretion of bile. Others like myself are now using this method to procure specimens of the pancreatic juice. The method is in need of much refinement. All that may be said is that one may determine the presence or absence of the pancreatic ferments. A much more direct method, to be sure, than the indirect way of examining the feces for pancreatic digestion. The methods of determining the character of the external function of the pancreas have not been satisfactory. It seems to me that we are now in a better position to obtain pancreatic juice directly from the duodenum by the use of the Einhorn tube, the normal physiological excitor of the pancreatic juice being the acid chyme. According to Bayliss and Starling, the acid chyme as it passes from the stomach into the duodenum by its action on a substance called prosecretin, found in the duodenal mucosa, converting it into secretin, which is carried by the blood to the pancreas, excites the secretion of pancreatic juice. Pawlow showed that fats have a similar action in exciting the pancreatic juice. Pawlow thought that the pancreatic juice was excited through the nerves of the duodenum and pancreas.

One obtains the pancreatic juice from the duodenum by the use of the Einhorn or other similar duodenal tube and bucket. For determining the presence of the pancreatic ferments Einhorn employs the Mett method. I have also found this a convenient way for testing the presence or absence of the pancreatic ferments. This test is purely a qualitative one. Physiological chemists have made and are making efforts to perfect a quantitative method. Of the different tests to determine the efficiency of the pancreas, some are for the internal function, glucose metabolism and endocrine action, i. e., Loewi's epinephrine mydriasis test; others for the external function, as shown by the examination of the stools. Those tests give us information only when the pancreas is in an advanced state of disease or in case of the absence of the pancreatic ferments from the intestine due to obstruction of the ducts by disease of the pancreas itself or disease of other structures in relation to the ducts. The complete exclusion of the pancreatic secretion from the gut means that not only must the duct of Wirsung be occluded, but the duct of Santorini is also obstructed. We know in a percentage of cases that the duct of Santorini and the duct of Wirsung communicate within the substance of the pancreas. Opie found in one hundred specimens examined there was no communication between the two ducts in ten instances, and in four others there was an indefinite union.

VALUE OF TESTS FOR PANCREATIC INSUFFICIENCY.

R. L. Wallis (2) says no one test can be said to be pathognomonic of pancreatic insufficiency. The association of positive results in three tests, the increased diastatic content of the urine, the Loewi epinephrine mydriasis test and the presence of glycosuria affords strong evidence that the pancreas is at fault. If there is in addition creatorrhea and steatorrhea the suspicion of pancreatic insufficiency is confirmed. A review of the cases reveals the fact that certain tests in their present form are of no value in diagnosing the presence of pancreatic disease. This applies more particularly to the methods of estimation of trypsin and diastase in the oil test meal and feces. The Sahli test, Kashiwado modification of Schmidt's test and the Cammidge pancreatic reaction, the Sajodin test of Winternitz, is of doubtful value. Examination of the feces for pancreatic digestion is of great value, and this combined with our ability to aspirate pancreatic juice directly from the duodenum is a distinct advance.

In acute pancreatitis steapsin and trypsin are the ferments that are of particular interest to the surgeon. Steapsin is important from the viewpoint of diagnosis. It normally acts on the fats in the intestine, but when it is liberated into the peritoneal cavity as the result of disease or injury to the pancreas it produces those grayish white patches of fat necrosis by its action in converting neutral fat into fatty acids and glycerin. These areas of fat necrosis vary in size, but they are usually not more than two or three mm. in size scattered over the omentum and are characteristic of acute pancreatic disease. Once seen they are not likely to be mistaken for anything else. It has been stated that in severe cases of pancreatitis of a fulminating type, with a short and rapid course, fat necrosis may be absent.

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*Delivered before the Philadelphia County Medical Society, October 12, 1922.

A more powerful and a more deadly ferment is trypsin, being profoundly toxic when set free and activated in the peritoneal cavity. It exists normally in the pancreas as trypsinogen, and is activated in the intestine by the enterokinase which converts it into trypsin. Infection or injury to the pancreas resulting in necrosis of the pancreatic tissue also activate the trypsinogen into trypsin. In any of these diseases or injuries to the pancreas in which enterokinase, or infection or injury causes necrosis of pancreatic tissue, trypsinogen is activated into trypsin with its resulting toxic effect. Halstead in experiments has shown the similarity to the toxic effect of acute pancreatitis and of high intestinal obstruction. In some forms of pancreatitis, especially in chronic pancreatitis, it has been considered sufficient to drain the gallbladder. The anatomical arrangement of union between the duct of Wirsung and the ductus choledochus is such that it is possible only in a certain percentage of cases to drain the pancreas in this manner. Drainage of the gallbladder will drain the pancreas in some cases, but in others it will not drain the pancreas because of the variations in the form of union between the duct of Wirsung and the ductus choledochus. In the former instance the duct of Wirsung joins the common bile duct or empties into the ampulla of Vater; in the latter cases the duct of Wirsung empties into the duodenum by a separate opening. It is not clear just how chronic pancreatitis is benefitted under these circumstances unless it is the drainage of the lymphatics that takes place by way of the cut surface of the gallbladder. In other cases of pancreatitis removal of the gallbladder when it is found to be the focus of infection is sufficient to cure the pancreatitis without drainage, so that the pancreas recovers itself when the source of infection has been removed. Recovery is not only due to drainage of bile and pancreatic juice, but also to drainage of the lymphatics. In acute pancreatitis drainage by way of the ducts is not enough, but the gland must be drained directly to provide escape for the pancreatic secretion as well as for any infection which may be present. We were of the opinion that the difficulties of dealing with the pancreas in making provision for the restoration of the anatomical relationship of the pancreas after operation on the head and body of the gland offered obstacles that seemed to be almost insurmountable. The question was: how could we reestablish conditions satisfactorily for the external secretion of the pancreas into the intestine and to restore normal function? However, it is now known that the external secretion into the gut may be dispensed with altogether without serious consequences to the organism.

Physiological chemists state that theoretically the external function of the pancreas can be dispensed with, and as it should only result in an inability to digest food in excessive amounts or unsuitable foods, and that a patient should be able to exist on a proper diet.

J. E. Sweet (3) has shown that a dog from which the greater part of the pancreas has been removed with elimination of the external pancreatic function lived and seemed to be perfectly well at the time it was killed, ten months after operation, with the only clinical symptoms being loss of weight and the typical stools. Autopsy showed extreme atrophy of the spleen, the thyroid was very pale and translucent due to a colloid change. The intestines showed a marked brownish pigment. There was little fat on the body. Sweet studied the nitrogen metabolism of a dog from which approximately eight ninths of the pancreas had been removed, and compared this with the study of a normal dog of the same size, and showed that there was no difference in the rate of resorption or excretion of nitrogen. This suggests the margin of safety may permit of the removal of the greater part of the pancreas.

Frederick M. Allen (4) says that dogs after partial pancreatectomy are depressed, lose weight, have indigestion and diarrhea. These conditions are transitory. Later the dog digests reasonably well, gains in weight, and behaves normally except for the diabetic tendency. Glucose tolerance, however, is not an index as to how much of the pancreas may be safely removed, for Allen has shown that although a part of the pancreas, not large enough to produce glycosuria, had been removed from dogs, the dogs became weak and death resulted. Allen expressed his belief that death in these cases was due to deficient endocrine action.

Coffey (5) devised an operation on the dog in which he made a longitudinal incision in the jejunum —inserted the end of the stump remnant of the pancreas into the wound and sutured the edge of the intestinal wound around the pancreatic stump, thereby restoring the external pancreatic function.

In summing up the situation we have learned that the external pancreatic secretion can be obtained through the duodenum; alkalies lessen the secretion; that it is possible for animals to live with complete elimination of the external pancreatic secretion; that a large part of the pancreas may be removed. This carries us forward in the surgical treatment of diseases of the pancreas, especially in the treatment of neoplasms of that organ, to the point of making an effort for early diagnosis which would consequently lessen the mechanical anatomical difficulties of dealing radically with these growths. In growths involving the tail or the body of the pancreas one would not have to provide for the restoration of the external function. More or less extensive operations have been performed on the pancreas, but the patients upon whom radical operations had been performed for malignant disease involving the head of the pancreas died soon after the operation, so that we have not had an opportunity to study the effect of such an operation.

Since this paper was read I removed, on November 25, 1921, two masses of sarcoma (endothelioma) from the head of the pancreas. One mass was twelve centimetres in diameter and the other the size and shape of a normal gallbladder. The patient has left the hospital and returned to her home. The immediate result was excellent.

REFERENCES.

1. Pawlow: *Work of the Digestive Glands.* J. B. Lippincott & Co.
2. Wallis, R. L.: *Quarterly Journal of Medicine,* October, 1920.
3. Sweet, J. E.: *International Clinics,* Series 25, vol. iv.
4. Allen, Frederick M.: *Experimental Studies in Diabetes, American Journal of the Medical Sciences,* 1921.
5. Coffey, R. C.: *Annals of Surgery,* 1909, 50, 1238.

Clinical Observations on the Pathogenesis of Diabetes Mellitus*

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Diabetes, although its incidence dates back to ancient history, is still a topic that is discussed by internists without their reaching any definite conclusions as to how this condition is produced. In the past five years emphasis has been placed upon the treatment rather than the etiology. The wisdom of this is obvious since relief can be given to the sufferer while the varied views upon the pathogenesis of this disease are being aired.

We all know that the damaging evidence by which the diagnostician pronounces an individual diabetic, from the persistence of sugar in the urine—glycosuria. We assume that before sugar appears in the urine, there is, except in occasional cases of renal diabetes, a hyperglycemia. The explanation of this state of increased blood sugar has not yet been definitely settled. However, I think we are gradually approaching the solution.

HOW IS HYPERGLYCEMIA BROUGHT ABOUT?

We have an increase in blood sugar and the problem is:

1. Is it an overproduction of sugar, where the supply is greater than the demand, resulting in an accumulation and a consequent overflow, manifested by glycosuria?

2. Is it due to an impairment of the utilization of sugar, with an apparent normal production, resulting in a similar accumulation in the blood and overflow in the urine?

3. Is it a combination of both of these? May it not be possible that through some disturbance there is diminished utilization by the tissue cells which constantly call upon the sugar producing mechanism for an increased output. This in time upsets the finely balanced centre resulting in overproduction.

THE THEORY OF OVERPRODUCTION.

Some, particularly Von Noorden and his coworkers, have leaned toward the overproduction theory. Briefly, their excellently constructed ductless gland schema is this:

The liver is the main reservoir for glycogen. (I am omitting details of its physiological functions, glycogenic and glycogenetic.) The distribution of the stored up sugar is more or less controlled by the ductless glands. Some restrain the sugar production and distribution, e. g., the pancreas, others may stimulate it, e. g., the adrenals. Some glands may impair the checking influence of the pancreas producing the same effect as that of stimulating the centre of production.

The pancreas, particularly through its islands of Langerhans, is the check or rein upon the carbohydrate metabolism, much as the vagus keeps the heart under control. When the efficiency of the pancreas is impaired as a result of disease, injury, or vascular changes, the control over this mechanism is hampered or lost, whereupon the system is flooded with abnormal quantities of sugar.

The adrenals are sugar mobilizers. When stimulated through the sympathetic nervous system, they exert their influence upon the liver, resulting in an increased production of glycogen. Their action therefore may be considered as being opposed to that of the pancreas.

The pituitary gland also works against the action of the pancreas. The anterior lobe evidently is credited with playing the rôle of producing glycosuria, when irritated.

The thyroid gland is capable of producing glycosuria either by augmenting the action of the adrenals or by inhibiting the action of the pancreas.

The parathyroids, on the other hand, exert an influence upon the carbohydrate mechanism similar to that of the pancreas.

IMPAIRED OR DIMINISHED UTILIZATION OF SUGAR.

This theory takes us away from the sugar production centre to the peripheral distribution points, the tissue cells.

Evidently there is some disturbance of the individual cells which interfere with their metabolic function. It may be that they are unable to receive the normal quantity of sugar or that receiving it they are unable to metabolize it properly. Something has happened and the tissue cells, failing to realize this change, continue sending messages to the distribution centres for more and more sugar, regardless of the abundance nearby. This goes on until the system is flooded with sugar to such an extent that the excess must be cast off through the kidneys.

In this view we may find an explanation of why a diabetic patient whose blood and urine are already overloaded with sugar and who is consuming a far greater quantity of it than is normal, still craves for sugar. We can now understand the patient's mad desire for sugar and his apprehension when starches and sugar are struck from his diet.

This leads us to the next problem, why do the cells fail to utilize the normal amounts of sugar?

We have three views for consideration:

1. Is it due to a deficiency of the pancreatic hormone, which enables tissue cells to carry out properly their rôles in sugar metabolism?

2. Are the cells hampered in their work by infection, particularly of the low grade type?

3. Are there neurogenic factors which disturb the cell function?

Hamman (1) offers a fourth view which involves the chemistry of sugars. The question is raised as to whether there is not lacking that chemical change which normally prepares the carbohydrates so that they can be utilized by the cells. Nothing definite has been accomplished toward settling this question.

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*Read before the Northern Medical Society.

Allen (2) discusses one phase of this problem in a paper published recently. He dwells upon the pancreatic hormone and its distribution to the peripheral cells whereby they are enabled to carry out their duties in carbohydrate metabolism. This again brings into the discussion the endocrine system, but we are viewing it now from another angle. We are considering the peripheral metabolism. Two things may influence this: 1. Some disturbance of the pancreas, particularly of the islands of Langerhans, which causes a lessened production of this pancreatic hormone thereby materially affecting the metabolism of sugar by tissue cells, or 2, some disturbance in the tissue cells themselves which impairs their efficiency.

It may be possible that the cells are hindered in functioning properly as a result of some low grade infection existing in the teeth, gallbladder or in the intestines.

In a large proportion of cases, one may notice that pyorrhea is present or that the teeth are missing. Constipation is commonly present. It is quite conceivable that a low grade infection may play some rôle in the pathogenesis of diabetes. The constant and prolonged absorption of toxins and toxic products ultimately may manifest their effects upon the tissue cells producing impaired function.

It is interesting to note Pemberton's (3) views upon carbohydrate metabolism and arthritis. He mentions that in chronic arthritis there is often retarded metabolism with hyperglycemia. Anyone who has been in contact with diabetics may have observed that even mild infections, such as colds or coryza, may produce a rise in the glycosuria or its recurrence. My observations concur with those of Leyton (4) and others.

I am not prepared to say what rôle acute infections may play in the causation of diabetes. Personally, I have seen only one case in which the onset of this condition might be attributed to a severe attack of influenza. Occasionally cases are reported in the literature where diabetes has occurred in connection with this or that disease, but these reports are so sporadic that we may consider them a coincidence.

Hitherto there has been a tendency to skepticism when disease of the gallbladder has been mentioned as a possible etiological factor in diabetes. Of late, our surgeons have written upon the possibilities of pancreatic involvement through this source. Deaver (5) considers chronic pancreatitis as a lymphangitis which may be secondary to a focus of infection in the wall of the gallbladder. Judd (6) was able to demonstrate the relation of the liver as well as the pancreas to gallbladder disease. This extension is presumably by way of the lymphatics. In cases of pancreatitis where diabetes was present, sections of the pancreas were excised for study. No report was made upon the examinations of these sections in his paper. No doubt it would be interesting to know the results of such findings.

NEUROGENIC FACTORS.

Too little attention has been given to the nervous system in the pathogenesis of diabetes. In analyzing the histories of diabetics, not uncommonly do we learn of prolonged mental strain. In some cases nervous shock seems to have some influence upon the appearance of symptoms. Also, what surgeon has not seen glycosuria develop after head injuries varying from a mere concussion of the brain to fracture of the skull?

Emotions likewise bear some definite relation to glycosuria. Kleen (7) cites examples suggesting this as a factor. A striking example was under my observation in the wards of the Jewish Hospital. A diabetic, neurotic and highly strung, was sugar free as a result of dieting and was doing nicely. During the night a cardiorenal patient, in the terminal stages, was admitted and placed in the adjoining bed. The diabetic patient was so perturbed and frightened that he slept very little. Uranalysis, in the morning, revealed presence of sugar. Joslin (8) quotes the studies made by Folin, Denis, Smillie, in which uranalyses were made from specimens obtained from students before and after college examinations. The results showed that seventeen to eighteen per cent. had small but unmistakable traces of sugar.

The more one sees of diabetic patients, the more one is convinced of the importance of the nervous element in this disease. Sometimes this strain may be the result of a shock, physical or mental, to the nervous system; more often, however, it is caused by continued domestic difficulties or business worries. As for the organic nervous conditions and their relation to diabetes mellitus, so much is written in textbooks giving in detail the lesions and the various experiments, that I need not comment upon them here.

CLASSIFICATION OF DIABETICS.

Diabetes has been grouped: a, according to intensity and severity into mild, moderately severe, severe, and grave; b, whether or not associated with acidosis and to what extent. (Stillman (9) divides his cases into four groups); c, I suggest classifying the cases according to the clinical picture, bearing in mind etiological factors and pathogenesis.

I shall dismiss groups A and B, and dwell upon the third. The different types that one meets in studying diabetic patients is impressive. Some patients are obese, others are not; some show distinct evidences of endocrinopathies; some have hypertension; some show malignancy. Some cases run a rapid course with a low tolerance for carbohydrates, others may live for years with a fairly low tolerance. In some cases the disease clears up quickly and the patient may partake of a rich carbohydrate diet without an immediate recurrence. The clinical picture in diabetes is so varied that here again we may meet difficulties which make it impossible to formulate a classification which will be acceptable to all.

We may, however, classify diabetes into the following groups, according to the clinical picture present: 1. Where there are evidences of endocrine dysfunction. 2. Where there are evidences of disturbances of tissue metabolism. 3. Vascular disturbances. 4. Tumors.

GROUP I.

In this group the outstanding feature is a disturbance of the ductless glands, either the pancreas, liver, thyroid, pituitary or adrenals. When we speak of the pancreas, let it be understood that the islands of Langerhans are the important structures involved. The disturbance of the pancreas may be temporary as illustrated by such cases giving a history of a fairly sudden onset without the complete array of symptoms so commonly found in diabetic patients. Such patients respond promptly to treatment and they may indulge in rich carbohydrate diets without a recurrence of glycosuria. These patients may have a normal blood sugar curve, and by some probably would be considered as a type of renal diabetes.

When the glycosuria persists and is controlled only by careful and rigid dieting, we may classify these cases as permanent disturbances, which, however, may be more or less improved by proper care.

Although it is difficult to state definitely that the pancreas is the organ involved, we know that there is a close relationship between the pancreas and diabetes. This relationship has been accepted by the authorities. I need not repeat the conditions which may bring about a disturbance of pancreatic function, which are, briefly—it may be part of a general disturbance, infection or of neurogenic origin.

As for the thyroid, pituitary and adrenals, and their relationship with hyperglycemia, I do not think we can justifiably label these cases with glycosuria as thyroid, pituitary or adrenal diabetes. When such clinical pictures are present, no doubt, we are dealing with the mixed types.

In discussing the mixed or the indeterminate type, I may mention obesity in conjunction with diabetes. Joslin (10) in an interesting paper expressed his views upon this subject. In an analysis of 1,053 cases, he mentions that in more than forty per cent. of the cases marked obesity preceded the outbreak. I agree with him in his opinion that the actual percentage is even higher, fifty to sixty per cent. would not be too high. However, he does not go into details as to how the obesity is brought about. If we knew this, it might throw some light upon the pathogenesis in these particular cases.

Obesity may be due to some endocrinopathy, besides overeating. It is quite conceivable that the underlying condition producing the obesity has an important rôle in the causation of this disease. However, even the obesity *per se* may have its influence. Allen (11), experimenting upon obese dogs, remarks that these dogs may be more susceptible to diabetes than normal dogs, but also states that the series was too small to arrive at any definite conclusions. The assumption is that the increased supply of fat or formation of adipose tissue imposes an increased burden upon the islands of Langerhans.

GROUP II.

Where the preponderance of the clinical picture is that of a disturbed tissue metabolism. In this group we may consider those cases in which the disease is presumably due to prolonged nervous and mental strain which ultimately impairs the function of the tissue cells.

To this group we may attach most of the cases occurring among Hebrews. Everyone knows of the prevalence of diabetes in this race. It has been attributed by many to the dietary excesses in carbohydrates. This in itself is not sufficient. Probably the real explanation lies in the fact that we are dealing with an exceedingly neurotic race. When there is added to this neurotic background a prolonged mental or nervous strain, or dietary excesses or both, is it any wonder that the carbohydrate mechanism gives way and diabetes results.

Likewise, we may include cases where there is impaired metabolism as a result of low grade infection.

GROUP III. VASCULAR TYPE.

Cases of this group are uncommon. The diabetic condition evidently is due to a pancreatic disturbance as a result of vascular changes, arteriosclerosis.

While on the subject of vascular conditions, I may add a few words upon hypertension in diabetes. This occurs in about twenty-five per cent. of those who are in their forties or above. When one considers the hyperglycemia, the various causes which may produce diabetes, viz., neurogenic, infection, endocrinopathies, or other cause, it is not surprising to find an increased blood pressure. As a rule, hypertension is met with in the big, obese, highstrung diabetic patient, who may offer a history of domestic or business worries. Although the added amount of sugar in the blood may have some influence upon the blood pressure, and I have seen it lowered when glycosuria has disappeared, I think that the same cause which produces the diabetic condition is responsible for the hypertension.

GROUP IV. TUMORS.

Malignancy, involving the pancreas whether primary or secondary, may result in a persistent glycosuria, which to all intents and purposes is diabetes. Such conditions are readily recognized.

SUMMARY AND CONCLUSIONS.

Diabetes is a condition, due to a disturbance of the pancreas with changes in the islands of Langerhans.

1. The hyperglycemia may be a manifestation of a disturbance of the ductless glands, commonly the pancreas, sometimes the thyroid, pituitary or the adrenals. This may be brought about either by neurogenic factors or by infection.

2. It may be due to some changes in the peripheral cells which are no longer able to utilize the normal quantities of sugar sent to them for the completion of sugar metabolism. This alteration in function may result from nervous influences or lowgrade infections.

3. More often, as I would suggest, there is a combination of influences. Something happens, whereby the cooperation between the sugar production and distribution centres and the peripheral cells, which complete sugar metabolism, is lost. Teamwork, which is absolutely essential, is lacking. There is a constant demand for increased sugar distribution despite the fact that there are present greater quantities of sugar than the cells can utilize.

Diabetics may be classified into four groups according to the clinical picture presented: I. Where there is evidence of endocrine dysfunction. II. Where there is disturbed tissue metabolism. III. Vascular changes. IV. Tumors.

Groups III and IV are uncommon, and since the pancreas is directly involved, we may practically consider these cases under that heading. Most of the cases belong either to the endocrinopathies or Group II, in which we have impaired metabolism of the peripheral cells due to the various conditions mentioned above.

Low grade infections may have a decided influence upon tissue cells interfering with their functions.

Obesity may have some effect by putting an unnecessary strain upon the supply of pancreatic harmone, but usually it is an effect rather than the cause.

I think that neurogenic influences play a greater rôle than hitherto believed. This factor is present in a large percentage of diabetic patients. It may act in two ways—either directly upon the sympathetic nerve system and its closely related ductless gland system, or by producing an altered function of the tissue cells.

A clearer conception of the pathogenesis of diabetes and the discovery of some etiological factor, may suggest other measures, which when combined with dietary regulations will enable us to get better and more lasting results in the treatment of this class of unfortunates.

2035 CHESTNUT STREET.

Diabetes Mellitus*

Personal Observations and Experiences

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Until a few years ago diabetes was considered as malignant as carcinoma is considered today. No method of treatment was known to prevent patients from going into a state of coma. With the present increased knowledge of the disease, its causes and treatment, it is possible to avoid coma and so lengthen the life of the patient considerably. In fact, during the past two or three years, the mortality has been greatly reduced. Joslin and Allen are the two men in this country who have contributed most largely to our knowledge of diabetes.

I have had occasion to observe diabetics who did not take any dietary precautions whatsoever, ingesting the regular full diets in large quantities, and finally succumbing to the disease. On the other hand, one particular case can be recalled, where the patient had been suffering from diabetes for over seventeen years, who during that time lived strictly according to the rules set down by his physicians, and had not eaten during that time any starches or carbohydrates whatsoever; yet, even he finally succumbed to coma, from which it can be concluded that the elimination of the starches from the diet is alone not sufficient to prevent the development of the disease. This patient's diet consisted largely of fats and red meats, and, in the light of our present knowledge, his death may now be traced directly to the ingestion of these two food stuffs. Special mention is made of red meats because they are broken down with the aid of trypsin into aminoacids which stimulate the adrenal glands, increasing the epinephrine, which in turn increases the sugar formation in the blood. All blood pressure raising substances lessen the pancreatic secretion—adrenaline is the most active in this respect. It is reported in the literature that in some cases adrenaline may even cause complete cessation of the pancreatic secretion, and it is this secretion which enables the tissues to break up into simpler substances all the sugars that are taken into the body. We also read of many cases where the patients have been kept on meat and fat diets for months at a time with the result that so much sugar was excreted that it was no longer possible to refer this to the intake of carbohydrates in the diet. So case after case can be reported where the succumbing to coma is without question due to the ingestion in large amounts of fat and protein.

SYMPTOMS.

Polyuria and glycosuria.—These are the most prominent symptoms. The higher the percentage of sugar, the more often the patient voids. It is a distressing condition, especially if, as is the case where acetone and diacetic acid are present, the patient voids large quantities about every half hour.

Fatigue.—Another symptom is a tired feeling. The patient is usually fatigued, and is especially fagged out even after slight exertion.

Weight.—Loss of weight is marked. A curious fact in this connection is that the more the person eats the more weight he loses. Closely connected with this last symptom is the fact that a diabetic suffers from hunger to the point of extreme pain, and this in spite of the fact that he may have eaten a sufficient amount of food at regular intervals.

Constipation.—The diabetic is likely to become constipated; the greater the polyuria, the more constipated is the patient.

Thirst.—This is an important symptom, though it is not present in all patients. It is more noticeable in those who have had the disease for a long time and have not had treatment in the early stages of the disease.

Irritability.—The patient is prone to become very irritable on the slightest provocation. It is most necessary to warn him to control himself as far as possible, for this constant "flaring up" aggravates the diabetic condition.

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*Read before the East New York Medical Society, June 22, 1921.

Neuritis.—Invariably neuritis develops in the diabetic patient. As a matter of fact, many times it is this subjective symptom which first causes the patient to ask the physician for advice. It is then that the patient discovers for the first time that he is suffering from diabetes. Treatment for diabetes, if successful, usually relieves the neuritic condition.

Teeth.—It has been found that many diabetics have loose teeth. This is due to the formation of lactic acid in the mouth and because the teeth have not been properly cared for. Stress should be laid upon the proper cleansing of the teeth.

ETIOLOGY.

Other workers beside Von Mering and Minkowsky have proved that diabetes is due to some faulty mechanism of the pancreas. After complete extirpation of the pancreas, diabetes follows. In some few cases where it was found that diabetes did not develop although the pancreas had apparently been extirpated, it was later proved that some parts of the pancreas were still left; thus lending further support to the earlier theory.

The theory at present is that a hormone exists in the internal secretion of the pancreas. This hormone is carried to the liver by the venous blood, which causes the proper disposal of glycogen. Absence of this hormone, therefore, causes glycosuria and hyperglycemia.

Among the symptoms mentioned above glycosuria is the most prominent, but more important than the glycosuria is hyperglycemia. Sometimes in diabetes glycosuria occurs without hyperglycemia, but seldom hyperglycemia without glycosuria. It is important to know that the carbohydrate tolerance only rises when the sugar in the blood has been for a long time normal, and the symptoms that we regard as a sequel of a long continuing hyperglycemia, such as furunculosis, impotence, diabetic gangrene, and rheumatoid pains, vanish only with the disappearance of the sugar.

In a great majority of diabetics we can observe a relation between the intake of food and the excretion of sugar. If such a diabetic is put on a constant diet, the excretion of sugar sets in at a definite level for a long time and such a patient may become sugar free, and if the amount of sugar in the blood remains normal for a long time, reparation occurs, so that later an ordinary diet may be taken without producing glycosuria. For this reason it is important that an early diagnosis be made, since at first hyperglycemia does no damage. It may not even cause glycosuria, provided that it has not reached the renal threshold; but if hyperglycemia is present for a considerable length of time, then there develops a permanent hyperglycemia and the well known diabetic symptoms are manifested.

TREATMENT.

A proper understanding of the treatment of this disease must take into consideration the fact that excess of food produces overstrain of the pancreatic function, with consequent improper digestion of ingested food and marked loss of weight. In the cases under my care, I have found that the more a diabetic eats the thinner he becomes. This can be explained by the fact that a certain part of the food eaten leaves the body in an unused condition. Overfeeding then is by far the most frequent explanation of the aggravation of the diabetic condition. In other words, undernutrition spares the already weakened pancreas and relieves the body from the necessity of taking care of the extra unused material. In spite of this treatment, many diabetics cannot become sugar free; the condition is too far advanced. If diabetics, suffering from a mild form of the disease, are kept sugar free for a considerable length of time, recovery to such an extent may sometimes occur that glycosuria and hyperglycemia will not occur after any quantity of feeding. In the early stages, glucose is more powerful in aggravating the diabetic condition than starch. Therefore, if glucose is omitted from the diet, and at the same time the diet otherwise kept low, there is a chance of recovery.

Whenever permanent diabetes is present, so that recovery is impossible, starch will bring on glycosuria more slowly than glucose, but just as surely. Therefore, even if a patient becomes sugar free, the amount of food eaten should be limited. Allen has shown in his experiments with animals that if they are fed on diets rich in carbohydrates they lose assimilation and die more rapidly than if fed with other foods. The same is true as applied to the human organism.

The benefit to the diabetic derived from underfeeding is confirmed beyond doubt in the prolongation of the lives of the great majority of the diabetics. In most of the cases assimilation can be preserved for a much longer time by a degree of undernutrition suited to the severity of the case and accomplished by the limitation of fats in the diet. This is so, because, for the thorough combustion of fats in the animal body a certain amount of carbohydrates must be simultaneously burned. Fat is a less readily oxidized food stuff than sugar and it therefore needs the fires of sugar to consume it. If the carbohydrate fires do not burn briskly enough, the fat is incompletely burned, and the result is the accumulation of ketone bodies. Acidosis, therefore, is due to the same cause as is starvation in health. It is an improper adjustment between the metabolism of fat and carbohydrate. In order to check a diabetic acidosis it is necessary to restore the proper ratio of fatty acid to glucose oxidation, which can best be done by the starvation process, complete rest and warmth. But this treatment may not suffice at first, because the diabetic organism has lost the power of even burning glucose derived from protein, so that it is only by persisting in this treatment by starvation that the ability to utilize the carbohydrates becomes so far restored as to prevent acidosis.

In treating a number of diabetic patients recently I put them on fluid diets only, such as water, tea, coffee and a little bouillon, and found that there was a great reduction in the glycosuria and a marked excretion of acetone. This has convinced me that fasting or drink days should be applied more often in the treatment of obstinate cases of diabetes. The conclusion that must then be drawn from the foregoing remarks is that there is likely to be more danger of serious acidosis developing in fat diabetics than in lean diabetics.

The recent war has done much to point out to us that the diabetic should rather be underfed than overfed. Bouchardat has noted that during the war, when food was being conserved, diabetics improved. Allen has seen at least a dozen mild cases of diabetes in which the glycosuria disappeared, and this is likewise attributed to the war diet. In four mild cases under the care of Klemperer the patients became sugar free during the same period. In four moderately advanced cases, there was a distinct rise in the sugar tolerance. Again the war diets are credited with the improvements shown in the patients. My own experiences bear out the observations of these men. The experiences of the war have also pointed out the harm done to the diabetic by physical overexertion. Falta reports that four hundred diabetics assumed a fulminating course after exposure to great physical exertion.

CONCLUSIONS.

In conclusion I wish to emphasize the fact that undernutrition, which does not mean starvation, is the patient's only hope. It simply means that the patient has to be very careful as to the quantity of food he eats. He must absolutely avoid the taking of food to the point of satiation. Indeed, the diabetic feels particularly well when he eats little. It is even wise to omit a meal once or twice during the week. This is the best advice we can give the diabetic today: that, if he would live out his allotted time, he must never forget that it is at the expense of his weight that he keeps his life.

323 Pennsylvania Avenue.

Diagnosis of Injuries of the Soft Structure of the Kneejoint*

By MAX STRUNSKY, M. D.,
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The weak point in the treatment of fractures of the knee joint in the past was overimmobilization. The weak point in the treatment of injuries of the soft structures of the knee joint at present is underimmobilization. In fractures of the lower part of the femur or upper part of the tibia the immobilization period of the knee by a splint or plaster of Paris cast was usually from three to six weeks. Recent experience has demonstrated that to immobilize the knee for so long a time is not only unnecessary but actually harmful. At present, in the treatment of soft structure injuries to the knee joint, the shortest possible period of rest is usually given the injured knee. In the vast majority of cases only a liniment is prescribed and soon the patient hobbles. I have treated a great number of cases of soft structure injuries to the knee joint and invariably found that at the time of the injury the patients have rested the knee only a very short time. An extreme example of this was when I found my patient painfully dragging himself along after the injury, his face plainly showing the agony produced by each movement. Another physician had previously assured the patient that his injury was only a sprain and advised him not only to walk immediately but to keep on walking.

In the treatment of fracture of the knee joint, not only do we have to treat the effect of the injury, but also the effect of overimmobilization. In the treatment of the soft structure injuries to the knee joint, not only do we have to treat the effect of the injury, but often even the greater effect of underimmobilization. The result of locking up the knee joint is atrophy of muscles and a stiff knee. Usually this only delays convalescence, for the reason that when the patient begins to walk the muscles get stronger and the knee joint more moveable. At most the end result of overimmobilization is a limited range of movement of the knee which early active movement might have prevented. The effect of underimmobilization, however, is much more serious.

When sufficient rest is denied an acutely injured knee, an excess of connective tissue will be the result, which will press upon nerve filaments. This is the cause of chronic pain in the knee, of which patients who have sustained soft structure injuries to the knee joint so often complain. In case of fracture of the cartilage the effect of too early walking may even prove more serious. The delicate network of connective tissue with which the repair process weaves to moor into place a replaced dislocated cartilage stretches and gives way when the patient walks too early. The effect of strain of this young connective tissue is not only the cause of recurrent chronic dislocation of the semilunar cartilage but the integrity of the knee joint is often sacrificed. Each time the offending cartilage leaves its mooring it either gets pinched between the bones or curls up on itself and, not only does it get pressed upon and injured during this migration, but in return inflicts a great deal of damage to the delicate mechanism of the soft structures of the knee joint. Nature protects the joint from the traumatism of the wandering cartilage by secreting a great deal of synovial fluid, but the effect of repeated dislocation of cartilage to the joint is often disastrous. To quote Jones (1), who in turn quotes the authorities of the world: "It is definitely known that irritation caused by the persistent recurrent displacement of semilunar cartilage or loose body is liable to cause hypertrophic arthritis or even tuberculosis of the knee joint." He also says that villous arthritis and joint lipomata is caused by small but recurrent injuries.

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*Read before the Staff of the Hospital Joint Diseases October 25, 1921.

The object of this paper is not only to warn against the underimmobilization treatment of soft structure injuries of the knee joint but mainly to rehearse the differential points in the diagnosis in these injuries. I have found a lack of diagnostic knowledge on this subject for most patients make the rounds with the diagnosis of either football knee, traumatic knee, or the most popular diagnosis of all, water on the knee. The diagnosis of soft structure injuries of the knee joint is based upon the fact that inflamed tissue when stretched will cause pain. When a patient keeps his knee permanently extended and resists an attempt to flex the knee his lesion is in front of the knee joint and consists either of a bruise or tear in the front part of capsule or in the ligamentum patella. In this case the muscles are spastic to prevent flexion of the knee which would interfere with the healing process.

In injuries of the internal lateral ligament which after all is the most frequent of soft structure injuries of the knee joint, the method of examination is as follows: The knee being flexed the leg is suddenly rotated outward in the extreme. This movement will cause a twinge of poin at the inner aspect of the knee in case of a lesion on the internal lateral ligament of the knee joint. The explanation of this is that with the external rotation of the knee the internal lateral ligament becomes taut. In the presence of inflammation of this ligament the sudden stretching must give rise to pain. The opposite maneuvre, i. e., the sudden internal rotation of the knee, is the test for the involvement of the external lateral ligament.

A frequent soft structure injury of the knee joint is when the patient keeps the knee slightly flexed and he is unable to extend it perfectly. In mild cases this is due to a bruising of the infrapatellar fat and the patient is compelled to keep the knee flexed in order to accommodate the swollen and enlarged fat pad. In severe cases this condition is due to a dislocated semilunar cartilage. In this instance the patient usually has felt that something has slipped out of place. The diagnostic spot is present. This consists of a pencil point sensitive area situated between the femur and the tibia found invariably at the measurement of an inch and a quarter from the apex of the patella to the inner side of the knee (2).

I desire to warn against taking the patient's word unreservedly that he has locking of the knee. Patients often mistake a mere catch in the knee for a true locking of the knee. The former is due to a momentary loss of control of the muscles which favor the injured part of the knee; the latter is caused by a dislocated cartilage, rice body, or synovial fringe being nipped between the two bones. In doubtful cases the patient should be given the benefit of the doubt and his leg manipulated for the reduction of a displaced cartilage. These movements consist, 1, flexion of the leg; 2, flexion of the thigh well on the abdomen, and 3, rotation of the knee inward to the extreme. This movement unlocks the knee. Finally the knee is extended in the extreme. If successful a click will be heard and the patient immediately feels a sense of relief. In old cases an anesthetic is necessary to procure complete relaxation of muscles and facilitate the slipping back of the offending cartilage which has already become adherent to its foreign soil. The narrowing of a knee space as revealed by the x ray points to a dislocated cartilage. The consideration of injuries to the crucial ligaments is purposely avoided in this paper.

REFERENCES.

1. Jones: *Orthopedic Surgery of Injuries*, vol. i, p. 332.
2. Frauenthal.

Congenital Deformities*

Some Observations on Diagnosis and Treatment

By C. E. COON, M. D., F. A. C. S.,
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There are altogether too many cripples, especially adults. We have become so accustomed to seeing these unfortunates as we go about day by day, it is seldom that we give them more than a passing thought, and we accept the twisted body, the short leg, the hunchback, the wry neck, the club foot and other crippling deformities as a part of the inevitable, with perhaps a feeling of pity for those who are thus seriously afflicted.

If we try to analyze the situation at all, we wonder whether these unfortunates ever had efficient treatment and what proportion of the total was incurable from the start. In this connection, we call to mind what the State has done and is doing for the insane, for the feebleminded and for the blind, and compare it with the very little the State can do with one institution for cripples.

Many cripples are selfsupporting citizens. Very likely they are not as efficient as they would have been with a lessened or eradicated physical handicap. Other cripples will continue as charity dependents who, with proper care and education, could have been developed into a community asset. In general, treatment should be given in childhood, during the formative period of bones, muscles, tendons, etc., and before the age of reasoning when the patient demands treatment. It is then too late. Many unfortunates go through life with a deformity which was entirely curable if it had been treated at the proper time, but they continue as cripples because of the procrastination of their medical adviser or the ignorance or superstition of a parent. We, as medical men, should continually keep in mind the thought "Am I doing all that can be done for the crippled ones among my patients?" Some crippling conditions yield readily to proper treatment at the proper time, others may not be materially improved under most efficient care. Congenital club feet and congenital dislocation of the hip are curable if not unduly delayed.

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*Read before Syracuse Academy of Medicine, February 7, 1922.

One of the most common deformities is club foot. The term is ordinarily applied to the equinovarus deformity, in which the forefoot is plantar flexed and sharply adducted, producing partial lateral mediotarsal dislocation. The foot is held in this faulty position by contracted plantar fascia and tibialis anticus and posticus muscles, the interossei ligaments being short. The equinus or toe drop is due to contracted plantar fascia and gastrocnemius through tendo achillis. This condition of rigidity and faulty position is easily recognized at birth and the danger of its being overlooked is not great. The mother is sure to note it in case the obstetrician does not examine the child.

Treatment of the ordinary congenital club foot is so efficient that there is no excuse for much less than one hundred per cent. cures. This can not be done by advising the parents to wait until the child is a year old or begins to walk and then tenotomizing the tendo achillis. Such advice is altogether too common and always results in a condition of deformed bones and cicatricial adhesions very difficult to overcome and such treatment does not relieve the deformity. Cure can not be effected except in very mild degrees of deformity by means of massage and manual stretching. It can not be accomplished by any method unless there is complete cooperation between parents and doctor.

Treatment should commence as soon as the child is born, and should be continued until the foot remains overcorrected after retentive appliance has been removed. Most orthopedic surgeons treat club feet by corrective plaster of paris boots changed frequently. The method of correction and application of plaster is important, and rarely does it become necessary to do a tenotomy. Plaster should be changed every week. The varus should be overcome before any attempt is made to stretch the tendo achillis to overcome the equinus. The plaster boots should extend from toes to middle of thigh with knee in right angle flexion. If properly padded and changed frequently there is rarely any skin irritation and the deformity can be overcome in five to ten weeks. There are other less common congenital contractions of the feet, including equinus which tends to correct itself when the patient walks, and equinovalgus which may result in a severe degree of rigid flat foot. The calcaneus deformities, varus and valgus, are rare.

Recently, in consultation with Dr. Schoeneck, I saw my first case of congenital calcaneovalgus. There was such marked contraction of all extensor muscles that the dorsum of the foot from ankle to tip of toes was in close contact with the anterior external surface of the leg. There was enough flexibility to allow the foot being pulled down nearly to a right angle with the leg, but when released would assume the original position. I was not able to demonstrate action of the gastrocnemius, all other muscles responding to pin prick stimulation. Under treatment by adjustable metal splint the gastronecmius promptly regained its function, and it is probable that the prompt recognition of the trouble had prevented the devitalization and paralysis of that muscle and the consequent permanent disability.

Congenital valgus is common and is the cause of much trouble later in life. Flat feet do not present many symptoms in childhood but much of the later trouble could be prevented by properly selected voluntary exercises, designed to strengthen individual muscles. Club feet may also occur as one of the sequelæ of spina bifida, and are often associated with motor and sensory paralysis. Good results following treatment are not common whether treatment is begun early or late.

Another quite common deformity is the congenital hip dislocation. Diagnosis is not often possible until the child learns to walk, and sometimes not then, especially if both hips are out. Diagnosis is not at all difficult either clinically or by x ray, but parents are slow about seeking advice, probably because the child seems in good health and does not give indications of pain or soreness. He only has a peculiar gait, and the parents think he surely will "grow out" of that. The observing parent will note in the unilateral dislocation that the limp is increasing as the weeks and months go by, or if the condition is bilateral that the original waddling gait which was thought to be a part of the process of learning to walk has become markedly exaggerated. Even then they are often likely to procrastinate and delay treatment until the favorable age for correction has passed.

Diagnosis is more difficult in the first month or two following the assumption of the upright posture than in the succeeding months or years. During the first months of walking, the loose joint capsule has not become stretched enough to allow the femoral head to ascend above the acetabulum. The increasing weight of the patient and the constant stretching of the capsule soon forces the head well above the acetabulum and a bearing surface is acquired on the side of the ilium. As the femoral head moves from the acetabulum upward to side of ilium, changes take place in the capsular ligament, the upper portion is stretched into a pouch shaped pocket which surrounds the head and lies between it and the ilium, the lower portion of the capsule is tightly stretched between the lower rim of the acetabulum and elevated intertrocanteric line, and the middle of the ligament comes close to the upper rim of the acetabulum and near the attachment of the upper part of the capsule. Adhesions are likely at this point and in delayed treatment often cause difficulty in the way of reduction, and after the age of ten years frequently prevent reduction. The most favorable age for treatment is before six years; from six to ten years treatment becomes more and more difficult; after ten years most cases should be treated by open operation.

Ordinarily it is not difficult to replace the femoral head in the acetabulum in manipulation treatment of patients of favorable age. With extension, rotation, and abduction, the femoral head is made to stretch the hourglass contraction of the capsule and then slides over the rim of the acetabulum. When reduced the changed position of the femur causes a relative shortening of all hamstring and adductor muscles, there is strong resistance to knee extension and adductors are very tight. It is necessary forcibly to stretch and sometimes break the long adductor of the thigh, but it is not necessary to stretch the hamstring muscles. Before fixation of thigh and hip, it is necessary to locate the femoral head well down in the acetabulum and near the anterior portion of capsule, and it is of especial importance to see that the head of the bone is neither in front of or below the acetabulum. It must be in the acetabulum and closely approximate anterior part of capsule, and this can be determined by palpation over the joint while the thigh is held in adduction and rotated, using the flexed leg as a handle. When the proper position is found, it should be maintained while the heavy plaster of paris spica is applied. The plaster should be continued to the middle of the leg with right angle flexion of the knee, no attention being paid to the flexion contraction of the knee due to the increased distance between the origin and insertion of hamstring muscles. At the end of the first month after reduction, I remove the plaster cast from the knee and advise and urge the patient to walk. I have never yet seen any difficulty arise from hamstring contraction and in a surprisingly short time the leg is capable of full extension. These patients get around without crutches and do very well in spite of the extreme abduction of the thigh.

Three months after reduction and two months after knee cap is removed the entire cast is removed, x ray made and if position is good another short spica is applied with the thigh brought down about half way between the first extreme abduction and the normal position. This cast is worn also for three months, then removed and patient watched very carefully for the next few weeks.

There are many other congenital deformities and abnormalities which demand attention, and one of our duties is to see that they get efficient and early treatment. We need some method of overcoming the lethargy and procrastination of some parents. We need institutions financed by the State and conducted under the auspices of some organization not political. We need a law providing for compulsory treatment to do away with the necessity of going through life with a physical handicap which could have been cured except for the obstinacy, superstition or ignorance of a parent. We need more trained orthopedic surgeons.

Orthopedic Significance of Backache*

By JAMES K. YOUNG, M.D.,
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With the exception of a few minor complaints the surgical conditions observed by the orthopedic surgeon are of a serious character for two reasons: first, the patients referred to him by the general practitioner are sent because their cases are difficult to diagnose; second, those referred to him by the friends of the patients themselves are sent late because the patients have already consulted a number of physicians without relief.

The minor conditions include pain, faulty poise from irregularity of the lower extremities, from sacroiliac strain, and strains and rupture of muscle fibres and functional curvature of the spine. Pain in the back is a constant symptom in many orthopedic conditions, and it is often the first symptom which compels the patient to seek medical aid.

FUNCTIONAL CONDITIONS.

Among the simplest functional conditions which the orthopedic surgeon treats are pain and backache due to inequality of the lower extremities. This tilting of the pelvis produces a strain on the back, particularly in the lumbar region, resulting in pain which is quickly relieved by equalization of the limbs. Many individuals complain of backache, particularly lumbar in character, the cause of which may be traced to faulty poise. Many children suffering from rickets, with prominent abdomens, recover from the osseous symptoms of this dietetic condition but still retain a lumbar lordosis or "sway back" with an accompanying prominent abdomen. The same faulty poise is observed in lordosis resulting from gastroptosis and particularly enteroptosis during and subsequent to pregnancy and in obesity. In this category belong the backaches, usually lumbar also, which result from faulty poise produced by flat foot, and the artificial equinus produced by modern high heeled shoes.

In the milder forms of scoliosis, backache is not a very pronounced symptom, the pain usually being confined to the neck and the occipital region. This passive congestion is also responsible for irregularities of menstruation, but lumbar pains from this condition quickly disappear as soon as the curvature has been corrected. In the severe forms of scoliosis pain in the back and the costal nerves is a frequent symptom from pressure of the ribs against the ilium and from intercostal pressure, but this also is relieved by correction of the curvature.

Traumatic scoliosis is always accompanied by pain in the displaced and bruised muscles. It is produced by violent wrenchings of the lumbar vertebræ, as in lifting loads or dumping coal with the lower part of the spine fixed and the arms extended.

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*Read before the Northern Medical Association, May 28, 1921.

ORGANIC AND TRAUMATIC CONDITIONS.

Among the congenital defects which produce backache are the irregular ossification of the lumbar and sacral vertebræ. The deformity known as sacralization of the fifth lumbar vertebra not infrequently produces backache in the lumbar region. This is due to the enlarged transverse processes which, having taken on the character of the sacral vertebræ, impinge upon the ilium and other bony processes in their vicinity producing pressure pains. The same pressure is observed in congenital defects of the lumbar vertebræ where the triangular shape of the body of the fifth lumbar vertebra allows a transverse process on one side to impinge against the ilium from the resulting curvature producing pain.

FRACTURES AND TRAUMATISM OF THE SPINE.

The fractures and traumatism of the spine and resulting deformities are attracting much more attention at the present time on account of the disability following these injuries to the back and their importance in industrial occupations. Linear fractures of the vertebræ and compression fractures of the bodies of the vertebræ occur more frequently than was supposed before the advent of the x ray. Fractures of the lumbar vertebræ frequently result from slight falls if the patient lands in a sitting position, and fractures of the lumbar vertebræ are not infrequent where workmen fall from any distance, particularly where they land upon the buttocks. Following fractures of the lower lumbar vertebræ, particularly the fifth, lateral curvature develops, which adds to the disability and backache. Fractures of the transverse processes of the lumbar vertebræ may occur without fracture of the bodies and may remain unrecognized for considerable periods, the disability being attributed to tearing of the lumbar muscles. The symptoms of fracture of the transverse process include local tenderness over the seat of the fracture, pain on rising or sitting down, as well as local pain, muscular rigidity to avoid pain on motion, limitation of motion, scoliosis and pressure pains.

Attention has been directed to disability following injuries to the back in industrial accidents by Sever (1). Attention has also been called to the necessity of early correct diagnosis and adequate care, since a late diagnosis and inadequate care are followed by prolonged suffering on the part of the patient and inability to work. Sever has analyzed a large number of cases of back strain, contusion and fracture of the spine, and has shown the long period of suffering and loss of employment when no treatment or inadequate treatment has been given. Likewise, Trask (2) has contributed a valuable paper upon the same subject which is sure to attract the attention of the surgeons and employers in industrial concerns where these accidents occur.

Many of these painful accidents result in permanent deformities, which may go unrecognized for long periods, because they have not received adequate attention at the hands of surgeons or industrial institutions. Similar injuries may occur to students, both men and women.

Direct traumatism of the spine, with sprain fractures or avulsion of ligaments, also occurs through railroad and automobile accidents and in some instances the deposits in the spine following these accidents, from periosteal overgrowth, have been diagnosed as malignant disease until the true nature of the disease was recognized. The same is true of sacroiliac strain and sacroiliac displacement, accompanied by pain, local in character, over the sacroiliac synchondrosis, but more particularly referred down the sciatic nerve from direct pressure of the articulation upon the lumbar plexus.

A rare deformity of the spine which occurs more frequently than is supposed is lateral deviation of the spine. Following strain the spine inclines to one side and remains fixed and painful unless relieved by appropriate treatment. This painful and disabling deformity has not received the attention it deserves, because while it may be quickly relieved early, later the deformity becomes permanent (3).

TUBERCULOSIS OF THE SPINE.

Backache is a frequent symptom of tuberculosis of the spine after the disease has developed, and a knowledge of this subject will enable the practitioner to recognize the cause of this symptom. In the early stages of tuberculosis the pain is referred to the distribution of the nerves so that backache is not such a constant symptom, but later when deformity occurs and abscesses complicate the condition, backache is a very frequent symptom. Later when a compensating lordosis develops, pain from muscle fatigue and strain is herewith present. In tuberculosis of the sacrum, or of the sacroiliac synchondrosis, pain, local in character, is always present from the beginning to the end of the affection.

OSTEOMYELITIS.

In the more rapidly destructive forms of osteomyelitis of the spine, such as pneumococcic and streptococcic infections, local pain over the necrotic areas is constantly present, while in osteomyelitis specific in character, nocturnal pain is the rule.

Actinomycosis is so exceedingly rare it need only be mentioned to complete the picture of the infectious. In it the scapular abscess is painful during its slow formation, and when the vertebræ become involved, pain localized over the affected area is always present.

MALIGNANT DISEASE.

There remains only the malignant disease of the spine which of all the painful affections is the most excruciating and persisting. In malignant disease of the spine pain is localized over the affected area, but following the extension of the disease pressure pain adds its terrors to the agony produced by the pressure of the malignant growth.

Of all the pain produced by deformities and disease of the spine, that from malignant disease is undoubtedly the most distressing and persisting.

REFERENCES.

1. SEVER: *Journal of Orthopedic Surgery*, November and December, 1919.
2. TRASK: *Modern Medicine*, October, 1919.
3. YOUNG: Lateral Deviation of Spinal Column, *Medicine and Surgery*, March, 1917.

222 SOUTH SIXTEENTH STREET.

Editorial Articles

PUBLISHER'S ANNOUNCEMENT

The A. R. Elliott Publishing Company has purchased the *Medical Record* from Messrs. William Wood and Company, and with our May third issue it will be consolidated with this Journal under the title

NEW YORK MEDICAL JOURNAL
and
MEDICAL RECORD

This consolidation marks an epoch in the medical publishing world, as it brings together under one organization four great medical periodicals. A more detailed announcement will appear in our next issue.

AN EPIC OF SCIENCE.

The idea of writing an epic of modern science to rival the great epics of war and religion has often tempted certain writers with literary imaginations. Indeed, the notion strayed as far as the stage, and produced the famous—and ludicrous—ballad of scientific discovery, *Excelsior.* Mr. Alfred Noyes, in the preface to his new book, *The Torchbearer* (Blackwood, London, 1922), hastens to say that he is not aspiring enough to have planned "a new poetic system, after the Lucretian model out of modern science," but, none the less, he has tried, on his own humbler scale, to realize the epic unity of scientific advance and to hymn the torch of knowledge as hand passes it to hand across centuries.

This volume is the first of a trilogy on the conquests of science, and dealing as it does with astronomers, it might, as its author suggests, have had the title *Watchers of the Sky.* It took shape in the poet's mind while he was passing the night on a summit of the Sierra Madre mountains, to watch the first trial of the hundred inch telescope. His memories of that night are embodied in the prologue to his large design:

> Wars we have sung. The blind, blood boltered kings
> Move with an epic music to their thrones.
> Have you no song, then, of that nobler war?
> Of those who strove for light. . . .

Forthwith we are plunged into the middle of the drama with an impressive tableau of the death bed of Copernicus. The shadow of haunting the steps of the early pioneers of science is already indicated in the whispers of his friends, who dare not show him what authority has done to his new book just received from Nuremberg.

> They have altered it!
> Though Rome approved in full, this preface, look,
> Declares that his discoveries are a dream!

Copernicus, however, dies in peace, crying, "Put out the lamp, now . . . light, and more light," and we pass to the more enigmatic figure of Tycho Brahe, the romance of whose life—his love for the peasant girl Christine, his disfigurement in a duel, and the golden vizard he wore to conceal it, his marvellous home on the island of Hveen, which he received from Denmark as a royal gift—is pictured in one of the most splendid pieces in this volume.

It is quite a coincidence that just when Mr. Noyes sets out to tell in verse of Tycho's famous edifice, the *Uraniborg,* an English edition of a finely illustrated work of Danish archeology should appear, namely Tycho Brahe's *Uraniborg and Stjernborg* (Milford, London, 1922), which attempts to reconstruct the glories of this strange astronomical palace. It is interesting to compare the plates of this book with Mr. Noyes's account of—

> The magic towers of Tycho Brahe . . .
> His armouries for the assault of Heaven—
> Circles in azimuth, armillary spheres,
> Revolving zodiacs with great brazen rings;
> Quadrants of solid brass, ten cubits broad,
> Brass parallactic rules, made to revolve
> In azimuth; clocks with wheels; an astrolabe.

From Kepler, next, we pass to the tragedy of Galileo, told with tender pity in a series of letters from his daughter and others. Here the conflict, already shadowed, between church and science comes to its height, but Mr. Noyes repudiates the *E pur si muove* legend, and renounces controversy to show with delicate intuition the battle of faith and science in Galileo's own distracted soul. The last section of this poem tells in some beautiful lines of Milton's visit to the astronomer in his blind old age.

The next scene of the pageant brings us to Newton and a graceful variant on an old story:

> Did Newton, dreaming in his orchard there
> Beside the dreaming Witham, see the moon
> Burn like a huge gold apple in the boughs
> And wonder why should moons not fall like fruit?

In this piece comes a delightful dialogue between Halley and Mr. Samuel Pepys on Newton's sanity, and after a glimpse of Sir John Herschel, the poet waves on his mountain top again beside "the new Uraniborg," and in passionate meditation on the meaning of what he has been shown attains at last to a deeper affirmation of ancient faith:

> When I consider the heavens, the work of Thy fingers,
> The sun and the moon and the stars which Thou hast
> ordained,
> Though man be as dust, I know Thou art mindful of
> him,
> And through Thy law, Thy light still visiteth him.

THE BARRAQUER OPERATION FOR CATARACT.

A number of months ago the news began to spread that an ophthalmologist named Barraquer, of Barcelona, Spain, had devised a new method of extracting cataracts in their capsules by means of suction. Naturally this aroused much interest, and the sketch of Barraquer, his operation, and the conditions under which it was developed, by Dr. John O. McReynolds in the February number of the *American Journal of Ophthalmology* is well timed.

It is remarkable, as suggested by McReynolds, that the three men whose accomplishments in ophthalmic surgery have attracted the greatest interest during the last quarter of a century should all have been located in cities out of the beaten paths of ophthalmic pilgrimage, yet so it has been. Henry Smith at Jullundur in the Punjaub; Robert H. Elliot in Madras; Ignacio Barraquer in Barcelona. In some respects their positions were similar. Each commanded a large area containing many millions of people, were practically supreme in authority, and had a free hand to develop procedures unhampered by constant contact with the influences of precedent and revered traditions. Barraquer had one advantage; his father, Jose Barraquer, has been for forty years a scientific and progressive ophthalmologist, and had provided for his son everything that improved facilities or inspiring example could offer.

But it is the technic of the operation which attracts us most just now. Every possible means is employed to guard against autoinfection, or infection from outside. Drops containing cocaine, euphthalmin and adrenalin are instilled at intervals during a period of two hours; this Barraquer feels secures a deeper anesthesia, a safeguard against annoying hemorrhage, and a wide dilatation of the pupil which may be contracted by eserine after the operation. Novocaine is injected into the tissues near the outer canthus and below the eye to temporarily paralyze the orbicularis and prevent a spasmodic closure of the lids. An assistant depresses the lower lid with one thumb and elevates the upper lid with a Desmarre's retractor, at the same time making some upward pressure on the brow. The corneal section is made upward along the limbus, comprising approximately two fifths of the circumference, and finishing with a conjunctival flap.

Barraquer feels that simple extraction is followed too often by prolapse of the iris, and that an ordinary iridectomy not only takes away the important function of the iris in the regulation of the entrance of light, but also predisposes to a secondary glaucoma from incarceration of fibres of the zonule or iris in the wound and impairs the efficiency of miotics in combating glaucomatous symptoms. So he prefers, when possible, to make a buttonhole iridectomy in the periphery at this point.

The patient looks a little downward, but never strongly downward, for this would court disaster. The surgeon takes the retractor controlling the upper lid in his left hand, and with his right introduces the suction cup through the corneal wound obliquely, at an angle of forty-five degrees to the vertical meridian. The cup is carried downward and forward into the area of the dilated pupil, gently insinuated beneath the lower margin of the iris, and made to rest accurately upon the anterior surface of the lens by a gentle movement, no pressure being allowed which might produce a premature dislocation. Not until one is sure of accurate application should suction be applied, for if suction is made before the adjustment is accurate the iris or the vitreous may be drawn into the cup. The vacuum produced must be right in both quantity and quality, or the capsule may be ruptured, the lens dislocated improperly, or vitreous lost. Barraquer maintains that it is essential one should use an adjustable vacuum to which can be communicated vibrations corresponding in frequency and amplitude to the elasticity of the lens. The vacuum intensity varies from fifty-five to sixty-five centimetres of mercury.

There are two ways of delivering the lens after it has been seized by the cup. After an ordinary iridectomy the best way is to advance slightly the position of the cup so as to stretch and rupture the superior fibres of the zonule, and then, gently tilting forward the superior margin of the lens so as to clear the upper lip of the corneal wound, slowly withdraw the instrument in an upward direction so as to deliver the lens with its upper edge first. But if a simple extraction is attempted, or if a buttonhole iridectomy has been done, the lens should be delivered with its lower margin first by rotating the cannula and cup with the attached lens in such a way that the inferior margin of the lens breaks away from its moorings, advances from behind the iris into the anterior chamber against the posterior surface of the cornea and passes on out through the corneal opening. In every case the iris should be carefully adjusted in its proper position after the delivery.

McReynolds presents no analytical criticism of the operation, but it is evident that he fears it will be received with undue enthusiasm, to be followed possibly by a reaction, so he calls attention to certain facts which are at least worthy of consideration. The instrumentation is largely within the eye, where toleration of traumatism is less than outside. The outer surface of the cornea will stand a great amount of rubbing, if kept moist, but a slight disturbance of the endothelium on Decemet's membrane may produce serious corneal changes. Each time the suction cup is introduced into the anterior chamber there is hazard of injuring this endothelium and of introducing infection. If suction is made when the cup is in the anterior chamber but not grasping the lens, there is danger of drawing into the anterior chamber foreign material from the surrounding area. Success requires not only a reasonable familiarity with this method, but an extensive experience in handling cataracts. The operation is more difficult and demands greater dexterity than the ordinary capsulotomy method, and it would be hazardous for one to undertake it unless he is prepared to deal promptly and effectively with any complication that might develop.

Doubtless we shall learn much more about this operation from the International Congress of Ophthalmology which will meet in Washington during the last week in April.

MEDICAL MEN IN POLITICS.

Medical men are rarely politicians, and for this the medical profession should be devoutly thankful. At the same time so long as doctors are impotent politically they are likely to be shorn of their rights. The ordinary citizen, now that the medical practitioner has been divested of the mystery that enshrouded his calling of yore, is likely to subject the medical profession to an analytical consideration based on ignorance and on a superficial education. The rise of preventive medicine, largely in Great Britain under governmental control, has tended to imperil the independence of the doctor to place him somewhat at the mercy of a bureaucracy whose policy seems to be guided by expediency. The medical profession in Great Britain has been neglectful of their own interests but are now becoming alive to the fact that it behooves them to use every means in their power to save their independence. With this end in view the Federation of Medical and Allied Societies was formed, the president of which is Sir Berkeley Moynihan, vice-president Sir Malcolm Morris, and honorary treasurers and secretaries, Sir Thomas Horder, Dr. J. F. Gordon Dill, Dr. Charles Buttar and Dr. Jane Walker. The objects of the federation are to provide organizations representative of every branch of medical science, with the means of exercising collectively their function as expert advisors of the community; to provide a central body, to which the government local authorities and the people generally can look for authoritative advice on health matters; to assist the citizen to a better understanding of the part that medical science should have, in his daily life, if he is to benefit by the advance of knowledge in the prevention and cure of disease.

The federation publishes a monthly journal, *Health*. This journal has recently been emphasizing the point that medical interests are represented in parliament in an inadequate manner. There is a medical group in the House of Commons, but it is painfully small. *Health* in its issue of February last asks these two pertinent questions: 1. Do the medical and allied professions believe that they are prepared for the election whenever it comes? 2. Do they imagine that the immense interests committed to their charge will be adequately represented in the next parliament if they are unprepared? The power of the small group in parliament is limited because it is a small group and it is a small group because the medical man professes a profound contempt for politics. The truth must be taken into consideration, that times have so greatly changed that politics are every man's business, and if the profession desires to protect its members it must fight for them.

Are eleven men in a parliament of over six hundred adequate to safeguard the interests of the profession? If the doctor is politically of no account, the health of the people is sure to suffer. Governments are not altruistic but closely watch the interests of their member who in turn are influenced by the voters. A modern government places the ear to the ground and will shape its policy in accord with the wishes of the people although many of these are ignorant as regards health matters. It must be understood, however, as the *Lancet* points out in an editorial in its issue of February 18th last, that it is quite certain that medicine in the House of Commons will have to rely upon qualified men elected in the ordinary way by constituencies to represent them as citizens and not primary in a medical capacity. The question of health would chiefly occupy their attention. The most encouraging part is that the community at large are becoming more alive to the value of hygiene and sanitation, and only require continued education on the subject to fully comprehend the need for an adequate number of doctors in parliament. According to Dr. A. C. Farquharson, who has been a member of parliament for three years, a doctor in parliament, i. e., as a doctor, can only hope to obtain a second rate place in the political world, and the measure of such influence as he may acquire as an individual will be increased or lessened by the width or narrowness of his outlook. The stereotyped view of the grayhaired expert will never carry himself or anybody else very far; but given youth vision and a capacity for hard work there is no reason why a doctor should not become a force in politics. He must represent constituencies as a citizen, with this difference that he will take especial interest in promoting measures designed to improve public and individual health, and as more or less of an authority on such subjects will wield an educative influence on the legislature and the country at large. The American people understand far better than those of Great Britain the importance of hygiene and are more open to educational propaganda on the subject, despite the fact that the medical profession do not count for much in politics. When the masses have learned thoroughly the lesson that good health is the most valuable asset that a nation or individual can possess, and that doctors can or should be able to show how this invaluable possession can be gained and retained, then they will insist that medical men shall be invested with such political power as shall enable them to carry out plans designed to promote health.

THOSE PORES.

In this twentieth century we still hear men, schooled in medicine at not so very remote a date, discoursing by mouth and print, about the dire results of the opening or closing of the pores. Which all goes to prove that the grammar of science, like the grammar of language, cannot successfully overcome familial habit and custom. Men trained in modern physiology still talk about the doings of the sweat ducts in the terms of their fathers and grandfathers. Our ancestors, knowing no better physiology or pathology, believed that they took cold because some unknown influence entered their bodies through the pores of the skin at a time when the owner was so unfortunate as to leave these openings ajar, and that, to prevent a similar mischance, the pores should be kept closed under like circumstances.

It is quite true that we do contract a cold, a sore throat or pneumonia on exposure to cold after being considerably heated, though such results will as surely follow prolonged exposure to cold in a delicate or fatigued person who has not been previously heated. In either case, however, the pores were open before, but they were just as open during the cooling of the body and subsequent chilling. Anyone who knows histology knows that the pores are never closed, for there is no trap door and not even a sphincter to block the passage into the subcutaneous tissues. While we discharge some fluid through them when perspiration is going forward, we cannot breathe in noxious effluvia or anything else through them at any time.

We know that acute respiratory diseases are contracted by prolonged exposure to conditions which extract heat from the body—low temperature of the air, or sometimes the ground on which we are tempted to lie, after exertion—low temperature plus a heatextracting draft of air, or, worst of all, low temperature plus rapid evaporation of moisture from the clothing and body. An abnormal condition of the circulation in the mucous membranes probably occurs, a reduction in activity of the leucocytes has been reported, and possibly there are still other factors which render infection easy. The matter is not yet clear, but one thing we do know—that the condition of the pores has nothing to do with such infection and that, night and day, year in, year out, the sweat ducts are always open. Such being the case, it is high time that twentieth century physicians should cease to talk in the jargon of those of the eighteenth century.

OCCUPATIONAL THERAPY.

A new bimonthly, *Archives of Occupational Therapy,* begins publication with the February number. The magazine is to be the official organ of the American Occupational Therapy Association, formerly the National Society for the Promotion of Occupational Therapy. The editors state that it is their purpose to make the magazine "a central organ for the publication of articles now scattered in many periodicals of various character or that lack entirely a proper medium for dissemination." In scope it will include the occupational phases of general medicine, surgery, psychiatry, institutional work, and social service. This breadth of scope is indicated by the contents of the first number, which contains articles on occupational therapy for mental disorders, tuberculosis, heart disease, the home bound, and children in hospitals. Among contributors are Adolf Meyer, Eleanor Clarke Slagle, H. A. Pattison, Frederic Brush, Evelyn Lawrence Collins, Isabelle L. Whittier, and Louis J. Haas. There are abstracts and book review sections and a bibliography.

WORKMEN'S COMPENSATION IN NEW YORK.

The inclusion of all occupational diseases instead of only a restricted number as a basis for the awarding of compensation to workers is urged in the sixth annual report of the Bureau of Workmen's Compensation of New York State, which is summarized in the *Monthly Labor Review* for January, 1922. Instead of enumerating a few diseases to be compensated, the report urged that all occupational diseases should be included without definition "unless certain diseases should be named as not to be so regarded." It is also proposed that injuries such as heat prostration, sunstroke, frostbite, caisson diseases, anthrax, lead poisoning and others should be regarded as arising out of the employment if they arise in its course. In fact, the bureau believes that all accidents should be made compensable if they arise "in the course of employment" instead of "out of and in the course of employment." The present limitation is said to be too narrow and to give rise to a large number of disputes. The bureau regrets the exclusion of maritime and admiralty cases, according to a recent court decision, and urges Congress to enact legislation so that workers in these industries may receive compensation in case of injury.

Since the compensation law went into effect the bureau has adjudicated three hundred and fifty thousand cases. During the fiscal year 1920 accidents to the number of 345,672 were reported, 1,236 of which were fatal. The number of claims submitted was 53,512, and in addition there were 12,206 agreements.

INDUSTRIAL ACCIDENT PREVENTION IN WISCONSIN.

Responsibility for industrial safety in Wisconsin is placed squarely upon the employers, according to a statement by George P. Hambrecht, chairman of the Industrial Commission of that state, which is printed in a recent issue of the *Monthly Labor Review*. The legislature of Wisconsin has adopted a definite policy of placing the burden of complying with the safety statutes and orders of the commission upon the employer, except in certain specified cases, according to the statement. If the accident can be shown to have arisen through the fault of the employer, the employee is entitled to fifteen per cent. additional compensation even though the employer's failure to provide proper protection was due to oversight or lack of knowledge. The commission sends out copies of safety codes to the employers, but according to the law injured workmen are entitled to their fifteen per cent. regardless of the commission's failure to notify employers that they were violating the law.

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News Items.

National Hospital Day.—More than four thousand hospitals will celebrate National Hospital Day on May 12th, the anniversary of the birthday of Florence Nightingale. Several hospitals in England, Canada and Australia will also observe the day.

Panama Government Provides Site for Gorgas Institute.—Announcement is made that a site adjacent to the St. Thomas Hospital has been provided by the Panama Government for the proposed Gorgas Institute. Dr. Richard Strong, professor of tropical medicines at Harvard University, has been elected director of the institute.

Public Lectures on Mental Hygiene.—The Mental Hygiene Committee of the State Charities Aid Association announces that thirty-one distinguished psychiatrists and other authorities on mental hygiene have volunteered to give public addresses from time to time on mental hygiene topics. These lectures are a part of the committee's campaign to inform the public concerning the nature and proper treatment of mental diseases and defects.

Testimonial Dinner to Dr. Baker.—A testimonial dinner will be given Dr. S. Josephine Baker at the Hotel Commodore on Thursday evening, April 20th, in celebration of her twenty years of public service. The participants will represent every child saving interest and other public movements of New York.

Physicians Wanted in Indian Service and Coast and Geodetic Survey.—The United States Civil Service Commission announces an examination for junior medical officer, to fill vacancies in the position of physician in the Indian Service and of surgeon in the Coast and Geodetic Survey. Applications will be received until further notice, on account of the needs of the service.

Tuberculosis Death Rate High in France.—Figures made public by the permanent Commission on Tuberculosis show that the mortality from tuberculosis in France is thirty-two in 10,000, against seventeen in Germany and fourteen in England. Paris suffers more from it than any other city in France or any other world capital. France has more than 100,000 victims of that disease annually.

Police Surgeon and Medical Officer Wanted for Fire Department.—The Municipal Civil Service Commission for the City of New York announces that applications will be received for the position of police surgeon and medical officer up to four o'clock on April 27th. The requirements are a license to practice medicine in the State of New York, one year's internship in a general hospital, and five years additional practice. The salary is $3,900 a year for part time service. The age limit is from twenty-five to forty-five years.

Mount Sinai Hospital's Last Three Buildings Dedicated.—Mount Sinai Hospital's building program, planned early in 1913, was completed on Sunday, April 9th, with the dedication of three buildings, the private pavilion, the children's pavilion and the auditorium. The addition of these to the fourteen buildings already standing is said to make Mount Sinai the second largest private hospital in the world, being surpassed only by the London City Hospital. These three buildings were erected at a cost of nearly $3,500,000. It has been hinted that the institution may become a postgraduate college.

Annual Meeting of French Hospital Alumni.—The Society of the Alumni of the French Hospital of New York city celebrated its reorganization with a dinner on Saturday evening, April 1st. The following officers were elected for the ensuing year: President, Dr. Louis M. Alofsin; vice-president, Dr. Henry C. Falk; treasurer, Dr. Hector McNeile; secretary, Dr. Richard E. Gordan. Mr. Lucien Jouvand, president of the French Benevolent Society, who was the guest of the society, was unanimously elected honorary president. The chair selected the following members who, with the elected officers, would constitute the executive committee to manage the affairs of the society: Dr. Maximilian A. Ramirez, Dr. James R. Lincoln, Dr. Robert E. Pound, Dr. Philip M. Grausman, Dr. Jose L. Medina and Dr. Irving D. Williams. Dr. Morris Stark acted as toastmaster in the absence of Dr. Charles Krumweide.

The Radio Health Talks.—The third of this series of five minute health talks prepared by Commissioner Hermann M. Biggs, of the New York State Department of Health, was on public health laboratories. It is intended that these talks shall be of practical value in giving information to the public which will aid in the prevention of disease and the preservation of health.

Clean Up Week.—This week has been designated as annual clean up week in New York State by Dr. Hermann M. Biggs, commissioner of health. In a letter to mayors, village presidents and boards of health, the commissioner called attention to the practical importance of civic cleanliness in the promotion of order, decency and public health. Local authorities were urged to take all necessary steps to secure cooperation of citizens in the collection and disposal of accumulated refuse.

Medical Fellowships.—The National Research Council announces the establishment of fellowships in medicine created for the purpose of increasing the supply of thoroughly qualified teachers in medicine in both clinical and laboratory subjects and in both curative and preventive aspects. The fellowships are supported by appropriations of the Rockefeller Foundation and the General Education Board amounting to $100,000 a year for a period of five years. Those receiving awards will be known as Fellows in Medicine of the National Research Council. To qualify for appointment as a fellow, a candidate must have the degree of doctor of medicine or doctor of philosophy from an approved university, or preparation equivalent to that represented by one of these degrees. Correspondence concerning the fellowships should be addressed to the Division of Medical Sciences, National Research Council, Washington, D. C.

Dr. Price to Investigate Industrial Medicine in Europe.—Dr. George M. Price, director of the Joint Board of Sanitary Control and Union Health Centre, sailed for Europe on Saturday, April 15th, for a stay of six months. Dr. Price has been appointed as special investigator by the United States Department of Labor, to bring up to date his former study of administration of labor laws and factory inspection in Europe, as embodied in *Bulletin 142 of the Bureau of Labor Statistics*. While abroad, Dr. Price will visit many tuberculosis clinics and sanatoria, will attend the International Tuberculosis Conference at Brussels, and will make a special study of industrial clinics and socialized medicine.

Typhoid Mortality.—The Department of Commerce announces lower mortality rates from typhoid fever in recent years. As the amount of typhoid fever in a community is recognized as one of the best indexes of its healthfulness, so also the mortality rate from this cause is a very important sanitary index. The steadily decreasing mortality rate from typhoid fever is therefore most gratifying, a decrease in the registration states of 1916 from 13.3 in 100,000 population in 1916 to 7 in 1920. In 1920 of the states in the registration area Massachusetts and Wisconsin share the honor of having the lowest rate (2.5) while the highest (22.4) was in South Carolina.

Deaths from Automobile Accidents in New York.—There was an increase of thirteen per cent. in the number of persons killed in automobile accidents in the cities of the State in 1921 over 1920, according to reports received by the New York State Bureau of Municipal Information. The total number of persons killed in cities last year was 1,079, as compared with 945 for the preceding year. The figures reported for New York City showed that 851 persons were killed there last year, while in 1920 the number totaled 730. In 1921 a total of 20,746 persons were injured there, as compared with 17,521 for 1920. The total number of accidents in that city last year was 27,326, as compared with 22,546 for the previous year. The total number of accidents in all the cities of the State last year was 50,770, as compared with 39,075 in 1920, or an increase of twenty-five per cent. The number of persons injured increased twelve per cent., or from 22,735 in 1920 to 25,988 in 1921.

State Civil Service Examinations.—Among the positions for which the New York State Civil Service Commission will hold examinations on April 29th are the following: Chief occupational therapist, State Hospital Commission; $1,200 to $1,320 and maintenance. Six appointments expected. The duties include the supervision of the treatment of mental patients by means of occupational therapy and the instruction and direction of nurses in occupational therapy. Medical assistant to Director (Tuberculosis Department), Grasslands Hospital, Westchester County, $3,000 with individual maintenance including quarters. The duties include responsibility for executive details and medical treatment of patients in the tuberculosis department under supervision of Director of the hospital. Assistant director, $1,800, and case work supervisor, $1,800, Department of Child Welfare, Office of Commissioner of Charities and Correction, Westchester County. One appointment expected to each position. Director of occupational therapy, State Hospital Commission, $3,500 to $4,000 with full maintenance while on duty at hospitals. The appointee will be expected to exercise general supervision over all occupational therapy activities in the New York State hospitals. Laboratory apprentice, Division of Laboratories and Research, State Department of Health, $840 to $1,020. Assistant chemist, Division of Laboratories and Research, State Department of Health, $1,500 tó $1,800.

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Died.

Bird.—In Brooklyn, N. Y., on Monday, March 27th, Dr. James Rufus Bird, aged eighty-seven years.

Ettinger.—In New York, on Saturday, April 8th, Dr. Henry Ettinger, aged sixty-two years.

Griswold.—In New London, Conn., on Wednesday, March 29th, Dr. Charles A. Griswold, of Fulton, Ill., aged ninety-one years.

Lynah.—In Charleston, S .C., on Friday March 31st, Dr. Henry Lowndes Lynah, of New York, aged forty-three years.

Sutton.—In Hamburg, Germany, on Thursday, March 30th, Dr. McWalter Bernard Sutton, of New Rochelle, N. Y., aged forty-nine years.

Book Reviews

ORDINARY DISEASES.

The Treatment of Ordinary Diseases. Notes from the Record Book of an Old Practitioner. By BEVERLEY ROBINSON, M. D. (Paris), Emeritus Clinical Professor of Medicine at University and Bellevue Hospital Medical College, New York; Consulting Physician to City and St. Luke's Hospitals, etc. New York: American Medical Publishing Company, 1921. Pp. 132.

This little volume, recording the experiences of a practitioner whose professional intimates included such names as Janeway, Delafield, Polk, Peabody, Bull, McBurney and Bryant, is dedicated to the loving memory of those departed medical giants. The reviewer finds it rather difficult to express his feelings and emotions regarding it, because these men were his teachers and the work under review represents the things they taught in the manner in which they taught it.

To review such a volume, therefore, brings one back to his school days, when the professor was so big a man as to overawe the bench warmers sitting at his feet by his very greatness, as compared with their profound ignorance. Unfortunately the volume not only recalls those men and those days, but it gives one the impression that medicine has not moved since then. The volume is interesting, indeed, not so much as a reminder of the generation just passed, but as an indicator of the great changes that have come over medicine in the past two or three decades. The book emphasizes these changes by omitting them almost entirely and seemingly purposely, for it is difficult to realize or even to imagine that the venerable author has been standing still all these years and not absorbing at least some of the newer ideas of contemporary medicine.

We look in vain for mention of the endocrines, for instance. Many kinds of headache are mentioned and prescribed for but the pituitary headache does not exist. Vaccines are mentioned only in connection with whooping cough, but the author has no confidence in them, though he admits having had no experience with them in this disease.

In the treatment of syphilis, as another instance, the microscopic examination for treponema is not mentioned, though the Wassermann test receives passing notice. If there is any doubt as to the character of the lesion, the author recommends waiting for secondaries and then "begin treatment either with the iodides, or with mercury and iodides combined"; "606" has little value in the author's opinion, and "when in doubt, abstain." It seems to the reviewer that even in the days of Taylor iodides had already been reserved for late syphilis, so that the present volume brings us back to those pre-Taylor days, when iodides were the sheet anchor in the treatment of early syphilis. The author is of the opinion that the old time methods of treatment of gonorrhea were quite equal if not superior to current methods, though he confesses his opinion is not based on personal experience with this disease.

Dr. Robinson bemoans the passing of the leech, especially in the treatment of ear inflammations, and believes that if they were used freely there would be much fewer mastoid operations. Surely the ear surgeons must have cornered the market in leeches for he states that they are scarcely procurable in New York at the present day. He likewise believes it is better to allow the inflamed drum membrane to perforate naturally than by means of the knife.

These few examples, taken from a long list, illustrate the character of this volume. It is interesting and to a certain degree instructive, but, with all due respect to the author, one cannot help feeling that it must be regarded as a relic of a past generation, almost entirely uninfluenced by the medical progress of the last quarter century.

THE CANCER PROBLEM.

Le Problème du Cancer. Par WILLIAM SEAMAN BAINBRIDGE, A. M., Sc. D., M. D., C. M., LL. D., professor de chirurgie à la New York Polyclinic Medical School and Hospital; chirurgien et secretaire des recherches au New York Skin and Cancer Hospital; chirurgien consultant, Manhattan Hospital, Ward's Island, etc. Traduit de l'Anglais par le Dr. HERTOGHE, membre titulaire de l'Academie Royale de Médecin de Belgique, d'apres la première edition de la MacMillan Company de New York. Louvain: A. Uystpruyst, editeur, Librairie Universitaire, 1922.

An interesting feature of the publication of this book is that it is the first work sent out from the Press of the Three Kings since the destruction of the University, including the press, by the Germans in 1914. As a matter of fact the book was published at the request of the authorities of the University of Louvain and it may be added that the printing, binding and general get up of the book reflect great credit on those responsible for it. The first edition was published in this country some years ago and favorably received. This edition has been translated by Dr. Hertoghe, of Antwerp, one of the best known investigators into the subjects of exophthalmic goitre and the internal secretions. It is superfluous to say that the English has been rendered into excellent French; Dr. Hertoghe is a scholar as well as being prominent in his profession. All the typographical errors have been eliminated and the whole text has been revised carefully and brought up to date in all essentials. The question of diet and its influence on the causation of cancer is discussed fairly and statistics are brought forward to show that even among vegetarians malignant disease is by no means rare. An important point emphasized by the author is that the most minute attention must be paid to surgical technic, always bearing in mind that the disease may be spread as a result of carelessness in this direction. Skilful surgery and refined technic are essential for success.

The author directs attention to his own method of starvation ligature and lymphatic block. It seems that the claims made for the value of this mode of operation are undoubtedly justified by results obtained. Another matter dealt with sanely and conservatively is that of x ray and radium treatment. The value of x rays of the new type is carefully considered and estimated without prejudice or bias. Indeed, all phases of the cancer problem are discussed in such a clear and intelligent manner that the book should be of the greatest use in French speaking countries where propaganda among the laity is necessary, to impress upon those showing symptoms which might mean the initial stages of the cancerous process the necessity for at once consulting a specialist. It should be generally and widely known that the only means now available of effectively treating malignant disease is first a prompt and accurate diagnosis and then by means of surgery or radiology, or both, prevent as far as possible its further development. It should not be forgotten that when the malady has reached a certain stage, successful treatment is more or less problematical, and all this is well explained in the book under review.

NUTRITION IN CHILDREN.

Nutrition and Growth in Children. By William R. P. Emerson, A. B., M. D., Professor of Pediatrics, Tufts College Medical School. Illustrated. New York and London: D. Appleton & Co., 1922. Pp. xxix-341.

Dr. Emerson discusses his subject under three leading topics: Diagnosis of malnutrition; malnutrition and the home; a nutrition program for the community. He states that his book is the result of a study of the nutrition problem for thirteen years, during which time he rejected one by one or relegated to a position of secondary importance the ideas that have been considered the primary causes of malnutrition, namely, poverty and insufficient food supply, improperly cooked food and consequent indigestion, bad air, heredity, syphilis, tuberculosis, and selfabuse. His investigations have led him to make five factors the basis of his present nutrition program—home control, food habits, health habits, physical defects, particularly obstructions to breathing, and overfatigue. Dr. Emerson believes that the public schools, where one third to one fourth of the children are found to be malnourished, are the best places in which to deal adequately with the problem, since it is possible through this medium to reach practically all the children of the community. Work done under this direction on this basis has yielded gains varying from one hundred to two hundred per cent. of the expected rate of growth for normal children. The condition revealed in the reports of the surgeon general of the Army, that barely fifty per cent. of our young men were physically fit for service in the first line, was largely due, the writer believes, to defects and habits remediable in childhood. An interesting fact emphasized is that the proportion of poorly nourished children is greater among the socalled better classes than among the poor and the immigrant groups, showing that the difficulty lies, not so much in the quantity of the food available nor in the mode of preparation, but rather in the food habits of the individual.

Dr. Emerson presents his subject in a clear, simple, forceful and logical manner, well adapted to the lay reader interested in the problem as to the welfare worker or the physician. He substantiates and elucidates his statements and conclusions by numerous statistical tables and charts. The book is a valuable contribution to the practical working out and application of scientific methods to the nutrition problem.

SHELL SHOCK PHILOSOPHY.

Deka Parsec. Shell Shocked Views of Life. By Louis Molnar. Los Angeles: Grafton Publishing Corporation, 1921. Pp. 196.

Deka Parsec, the hero—if such a term may be used for the chief character of a book practically without a plot—is in his own words "a perambulating shell shock, which means that I am different. . . . They spoiled a good engineer in the making." The spoiled engineer, having returned home after several months as an unknown quantity in a base hospital to find "the girl" married to another man, has calmly and cheerfully built himself a cabin in the high mountains, established himself as captain of a burro train, and leads the life of a mystic philosopher, with Paloma, his leading burro, as sole companion.

The book consists chiefly of dialogues with a friend, which are more truly monologues by Deka Parsec, on his changed views of life due to high explosives. Among the titles of the chapters are Charity, Ceremony, Walking, The Tourist, Caste, Suicide, The Ideal the Only Real, Love Murders, and The Poetic Attitude. The book is one of the many of a similar type to be found in postwar literature, products of war experiences on the part of their writers, or of some one near to them, attempts more or less significant to express and interpret the mental and moral upheaval of personality resulting from their sufferings.

The style is informal, whimsical and frequently humorous. The same things, however, have been said much better by other postwar writers, yet perhaps not just in Molnar's form of brief, essaylike dissertations on modern life and social conditions. The best thing about the book is the revelation of the spirit that actuated writing it—an idealism, perhaps rather impractical, but by no means blind, and a broad understanding and love of human nature.

AUTONOMIC NERVOUS SYSTEM.

The Autonomic Nervous System. By J. N. Langley, Sc D., Hon. LL. D., Hon. M. D., F. R. S., Professor of Physiology in the University of Cambridge. Part I. Cambridge: W. Heffer & Sons, Ltd., 1921. Pp. 80.

Part I of the *Autonomic Nervous System* presents briefly the nomenclature, plan of origin and peripheral distribution, the nerve fibres, action of drugs and the tissues enervated. The work promises to be of value when completed, being readable and presenting the subject in an understandable way.

SHAKSPERE'S KNOWLEDGE OF MEDICINE.

Shakspere's Medical and Surgical Knowledge. With Explanatory Notes. By John W. Wainwright, M. D. New York: Published by the Author, 1915. Pp. 78.

This monograph shows painstaking work and should be of interest to many. It gives a concept of the medical knowledge of Shakspere's day and also shows the great master's familiarity with the many recognized maladies of his day. The manner of grouping the references under the various heads is of value to the research student. The book is attractively printed and contains an excellent portrait of Shakspere.

MEDICOLITERARY NOTES.

Notturno, the latest published work of Gabriel D'Annunzio, was written under strange conditions indicative of the Italian poet-aviator's irrepressible energy and activity. A serious injury incurred while flying threatened the sight of both eyes and compelled the sufferer to spend several weeks in bed in total darkness. While thus confined he occupied his time by writing upon paper strips pinned one below the other on a board supported by his knees. These strips were collected, deciphered, transcribed and recently published as *Notturno.*

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The second report of the American Relief Administration's European Children's Fund in Hungary, covering the period from September 1, 1920, to January 1, 1922, shows that the additional feeding conducted by the administration in Hungary resulted in an increase of weight in a comparatively large percentage of children. Among the groups studied, kindergarten boys showed increased weight in 32.78 per cent., kindergarten girls in 36.27 per cent., school boys in 32.09 per cent., school girls in 38.4 per cent.

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The ossiphone, the invention of an Englishman, is receiving considerable comment in current British journals. It operates upon the principle that persons deaf through defects or disease of the outer ear may hear through the medium of the bony structure of the body, the sound being communicated by the instrument to the bones, thence through the aural nerves to the brain. The ossiphone, it is asserted, may be used, not only for ordinary conversation, but also in connection with the telephone. A description of the mechanism is quoted in *The Literary Digest* for March 18th.

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The Specialist is the title of a poem reprinted from *The Century* in the January issue of *Mental Hygiene.* Martha Haskell Clark is the author. The rôle of the mental specialist as practical, ethical and spiritual guide is very simply yet beautifully portrayed, probably for the first time in poetical literature.

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Dr. John T. MacCurdy, of the Psychiatric Clinic of Cornell Medical School, has in the same issue of *Mental Hygiene* an interesting review of *Psychoanalysis and the Unconscious* by David H. Lawrence, the English novelist. Dr. MacCurdy shows conclusively that this work is another example of the useless, foolish and perhaps even harmful results of attempts by the untrained lay mind, no matter how skilled and successful it may be along the lines of artistic or literary production, to encroach upon the field of the specialist in science.

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Members of the profession philosophically inclined will find matter for speculation in a study of personality by Thomas Mann, distinguished German man of letters, in the *Living Age* for February 18, 1922. The writer divides great personalities into two types: first, those elemental, vital, yet not necessarily intellectual persons who seem to be the expressions of Nature's highest laws; second, those who have made themselves great through revolt of mind or spirit *against* Nature and emancipation from her, in other words through illness. This is not the kind of illness, he states, that lessons human dignity by overemphasizing the physical; but the kind that deepens, elevates and strengthens human qualities. "The genius of illness," he says, "is more human than that of health. . . . Illness in its philosophical sense does not imply disparagement or inferiority. It is a condition that should be viewed as impartially as that of health. For either illness or health can be noble."

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Our World is the name of a new illustrated monthly promising to be of unusual and varied interest. It deals chiefly with aspects of political and social life and problems in the postwar world, and discusses these in an openminded and disinterested spirit. Among contributors to the first issue are Alfred E. Zimmern, Edward G. Lowry, Simeon Strunsky, Vernon Kellogg, Robert Underwood Johnson, Hilaire Belloc and Malcolm W. Davis. The American Geographic Society has prepared some excellent economic maps for this number of the magazine.

New Publications Received.

PSYCHOLOGY AND FOLKLORE. By R. R. MARETT. New York: The MacMillan Company, 1920. Pp. ix-275.

TRAITE D'UROLOGIE. Par G. MARION. Paris: Masson et Cie, 1921. Pp. xx-572.

L'INFECTION MENINGOCOCCIQUE. Par le Dr. CH. DOPTER. Paris: Libraire J. B. Baillière et Fils, 1921. Pp. 534.

THE KING OF IRELAND'S SON. By PADRAIC COLUM. Illustrations and Decorations by WILLY POGANY. New York: The MacMillan Company, 1921. Pp. 316.

THE BEST PLAYS OF 1920-1921, AND THE YEAR BOOK OF THE DRAMA IN AMERICA. Edited by BURNS MANTLE. Boston: Small, Maynard & Company, 1921. Pp. vi-471.

PAN. Translated from the Norwegian of KNUT HAMSON by W. W. WORSTER. With an Introduction by EDWIN BJORKMAN. New York: Alfred A. Knopf, 1921. Pp. xiv-202.

CONFÉRENCE INTERNATIONALE CONTRE LA TUBERCULOSE. Des Délégués des Etats ayant adhéré à la Société des Nations et des Etats-Unis d'Amérique. Paris, 17-21 Octobre, 1920. Paris: Masson et Cie, Editeurs. 1921. Pp. 212.

THE UNCONSCIOUS. The Fundamentals of Human Personality, Normal and Abnormal. By MORTON PRINCE, M. D., LL. D. New York: The Macmillan Company, 1921. Pp. vi-64.

INSANITY AND MENTAL DEFICIENCY IN RELATION TO LEGAL RESPONSIBILITY. By WILLIAM G. H. COOK. London: George Routledge & Sons, Ltd. New York: E. P. Dutton & Company, 1921. Pp. xxiv-192.

ERKRANKUNGEN DER ADERHAUT, DER NETZHAUT, DES N. OPTICUS. Augenveranderungendurch Eifte. Von Prof. Dr. IGERSHEIMER, Oberarzt an der Universitats-Augenklinik in Göttingen. Mit 15 Abbildungen. Leipzig: Verlag von Georg Thieme, 1921. Pp. 52.

DIAGNOSTISCHE UND THERAPEUTISCHE IRRTUMER UND DEREN VERHUTUNG FRAUENHEILKUNDE. Herausgegeben von Prof. Dr. J. SCHWALBE, Geh. San.-Rat in Berlin. Erstes Heft, Diagnostische u. therapeutische Irrtumer und ihre Verhutung in der Geburt. Von Geh. Med.-Rad Prof. Dr. FEHLING.. Zweites Heft, Diagnostische u. therapeutische Irrtumer und ihre Verhutung im Wochenbett. Von Prof. Dr. ZANGEMEISTER. Leipzig: Verlag von Georg Thieme, 1921. Pp. 140.

Practical Therapeutics

A NEW NONNARCOTIC DRUG WHICH IS BOTH HYPNOTIC AND ANALGESIC.*

By M. A. Burns, M. D.,
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Among the groups of hypnotics, the derivatives of barbituric acid have proved themselves superior, both as to the results of animal experimentation and clinical experience of many years, wherefore this group offered the best practical prospects. The alkylbarbituric acids as shown by Tiffeneau (1) are combinations of marked hypnotic groups and a relatively small lipoid solubility. However, should the alkyl radicals be so changed as to increase the otherwise small lipoid solubility, it follows that the hypnotic power of the substance can be successfully increased. The accuracy of this supposition has been both investigated and substantiated in a series of systematic experiments.

Allylisopropylbarbituric acid substantiates the accuracy of these theories and represents a new and efficient hypnotic which can produce effect in smaller doses than any other of the alkylbarbituric acids hitherto employed. Gratifying as these theoretical and at the same time practical results have been, the clinical requirements for a hypnotic had not yet been completely satisfied. Clinically, not only an active and harmless hypnotic is required, but above all one which, in addition to its hypnotic properties, also manifests an analgesic action.

The failure of many of the newer hypnotics is doubtless to be attributed to the fact that, notwithstanding their hypnotic properties, they are unable to remove the cause of the insomnia. They particularly disappoint when the insomnia is not due to nervousness only, but also when pain or other drugs antagonize the necessity for sleep. In these cases the physician is compelled to resort to morphine, or to drugs containing it, in order to obtain the necessary rest for the patient. The problem therefore presented itself to incorporate an analgesic constituent into the molecule of the allylisopropylbarbituric acid. This was accomplished by making a double salt with amidopyrin.

By this means allylisopropylbarbituric acid not only acquired the desired analgesic properties, but the high hypnotic potentiality already existing was fortified. On the other hand, the analgesic effect of the compound is so pronounced that it becomes manifest in doses where heretofore the hypnotic effect of allylisopropylbarbituric acid itself had not even manifested itself.

Allonal is, therefore, the only demonstrated synthetic hypnotic which, like morphine, simultaneously produces hypnotic and analgesic effects, and over and above that alkaloid, it possesses the unmistakable advantage of being relatively feebly toxic. Primarily, the unpleasant effects which so often cause the employment of morphine to appear risky were not to be expected in this case. For this reason a clinical investigation of the remedy appeared justified.

Allylisopropylbarbituric acid forms colorless crystals of 137° C. melting point, of a bitter taste, very slightly soluble in water, easily soluble in alcohol, neutral in reaction, and readily forming soluble salts with the alkalies. It is a hypnotic of the barbituric acid group, which includes veronal, dial and luminal.

Allylisopropylbarbituric acid, in small doses, acts on the central nervous system inducing sleep, without any noteworthy depression. The desired effect is produced by doses half as large as required with the other known hypnotics of this series, and even when high doses of allylisopropylbarbituric acid were given, the unpleasant byeffects familiar with the other hypnotics were absent.

Amidopyrin (pyramidon) forms slightly alkaline crystals, melting at 108° C., is almost tasteless, soluble in eleven parts of cold water, and readily soluble in alcohol. It is an analgesic acting upon sensory nerves.

Allonal is the compound formed by fusing allylisopropylbarbituric acid and amidopyrin in the molecular proportion of one to two. It is a yellowish powder, only slightly soluble in water, and possesses a bitter taste. The primary action of allonal is that of a depressant on the sensory nerves. There is no effect on respiration, nor any apparent depressant action on the circulation, unless the latter has been enfeebled by previous disease. Allonal has no hemolytic action on the blood. It is eliminated by the kidneys. Each tablet of allonal contains one grain of allylisopropylbarbituric acid and one and two thirds grain of amidopyrin.

Dr. Frank Wright, assistant professor of physiological chemistry, Northwestern University Medical School, and attending physician to Michael Reese and Mercy Hospitals, Chicago; Dr. Leopold Stieglitz, medical chief of the Beth Moses Hospital, New York, and Dr. A. C. Messmer, of Ardmore, Pa., have sent me reports of numerous cases in which they have used the new drug with good effect. I present below the histories of some of these cases in which allonal was used.

CASES OF DR. FRANK WRIGHT.

Case I.—Sister M., who suffered from chronic pancreatitis and chronic colitis. She obtained more relief and sleep from two to three allonal tablets than from anything else we had used in two years. Where morphine was used rather frequently formerly, one dose a day was all that was required and that a small one.

Case II.—Mr. D. This patient had a carcinoma of the rectum for which colostomy had been performed. He obtained considerable relief from the allonal, sleep being secured, which did not follow the use of morphine.

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*Read before the Philadelphia Neurological Society, February 24, 1922.

Case III.—Sister M. L., who suffered from chronic asthma. Here a decided relief from the paroxysms was obtained from the use of allonal which heretofore had required adrenalin entirely too frequently.

In a case of mucous colitis, in which the nervous symptoms predominated, the relief had been but partial and intermittent, the peristaltic contractions being sufficiently severe to awaken the patient and prevent further sleep.

In a case of arteriosclerosis with chronic cholecystitis, in which insomnia on the one hand and epigastric discomfort on the other had prevented sleep for a year and a half, allonal had been by far the most efficient sedative we had been able to procure.

A slight tendency to cumulative action was noted after it had been given for three or four days, a fact which could be readily made use of in spacing the doses.

CASE OF DR. LEOPOLD STIEGLITZ.

Case I.—An intractable case of intercostal neuralgia, probably due to a neoplasm pressing on the nerve, as the patient had had cancer of the breast on the same side some years ago. The allonal tablets gave the patient restful nights without the use of any opiates. Before allonal was given, codeine had to be given repeatedly during the night. I find the hypnotic effect of the allonal is cumulative and that if it is given every day the patient is likely to sleep a considerable part of the day. In order to avoid this cumulative effect, I am having it given two nights out of three.

This limited use of the drug encourages me in the hope that we have a means of getting along in many instances without the use of opiates.

CASE OF DR. A. C. MESSMER.

Case I.—J. C. F., aged fifty-nine. Records at the hospital in which he had been a patient in 1914 gave a history on which they based a diagnosis of tic douloureux. When I first saw the patient I found him in a fulminant attack of facial tic with excruciating pain affecting the right side of his face and head, the right leg and to some extent the left side were also affected. The jumping of the right leg and the spastic condition of the face caused excruciating pain. At the hospital he was given only chloral and morphine. I started to give him allonal after bromides, iodides, codeine and morphine failed; he stated that we aborted a facial tic after he had taken four tablets. I have since seen him three times and he told me his pain was almost gone; there was still some jumping and twitching of the right leg; while annoying, it was not accompanied by pain; his general condition was better.

The patient had been in the hands of so many physicians without relief that his family had looked upon his condition as hopeless and had declined to allow me to study the case systematically; they had told me to relieve the pain and make him comfortable and this allonal had done. I noticed no untoward effects; he is still taking two tablets every night.

The following are cases in which the new drug has been used in my service at the Philadelphia General Hospital:

Case I.—N. B., male, white, aged forty-one years. Suffering from a right hemiplegia, with aphasia and insomnia. The patient was given two tablets at 7 p. m.; at 8:30 was sleeping and slept all night. No change in blood pressure, pulse or respiration.

Case II.—W. S., white, male, suffering from tabes, sharp shooting pains in both legs. The patient was given two tablets at 7 p. m. and slept well during the night. Two days later the pains were again severe, two tablets were given with temporary relief, repeated in two hours, with relief. Morphine sulphate one eighth grain was given by mouth without relief. Is now being given one tablet three times a day. There is no pain. No change in blood pressure, pulse or respiration.

Case III.—C. A., colored, male, suffering from cerebrospinal lues; sharp shooting pains in abdomen and legs. Two tablets were given, there was relief in thirty minutes, lasting two hours. The dose was repeated, relief lasted three hours. The next night two tablets were given and repeated in one hour, gave sleep during the entire night. He is now given one tablet three times daily. No change in blood pressure, pulse, respiration or urine picture.

Case IV.—W. M., multiple neuritis. He had been restless and noisy under bromides, trional, luminal, chloral, morphine and hyoscine. Two tablets of allonal were given and repeated in an hour. He slept at intervals during the night, much better than with previous medication. Repeated with fair success, patient sleeping several hours during the night. The blood pressure before medication was 150-90; after medication it was 140-90. There was no pulse or respiratory change.

Case V.—M. D., white, female, aged seventy-six years. Suffering from rheumatoid arthritis, with rice body in left knee. Sleeplessness due to pain in knee joint. Two tablets were given at 7 p. m.; she was asleep in thirty minutes and slept until 6 a. m. The blood pressure an hour before medication was 195-95. There was no change, no pulse or respiratory change.

Case VI.—This was a case of melancholia with drug addiction. M. H., female, aged fifty years, came under my observation in March, 1921. Her suffering was intense. After several weeks she was not improving and I lost sight of her until November, 1921 (some eight months later). She had been in a local sanatorium during all that time, and in November, when I saw her again, she was somewhat improved, but by no means well. She left that institution, and after I had her under treatment for two weeks, she told me that she was not as well as she had been in the sanatorium, that my medicine did not relieve her, and that she was much more depressed. After getting in touch with the institution, I found that for some time she had been receiving as much as four grains of morphine sulphate in twenty-four hours. It was necessary, the physician said, in order to keep her quiet. I began giving her allonal. In the beginning I gave her one tablet three times a day and two at bedtime. This was kept up for several weeks, when I noticed a slight tendency to the cumulative effect. I withdrew the doses during the day and gave her two tablets at bedtime and bromides after meals. After two months this patient was not only cured of the drug habit, but was much better mentally. She had an important position and returned to work on February 1st. In this case I was able to withdraw the morphine at once without any serious results.

Allonal is administered orally in the form of two and two thirds grain tablets; our experiences show that one tablet acts well as a sedative, two tablets as an hypnotic, and that two to four should be used where an analgesic effect is desired; this dose may be repeated in one to two hours where required. The action seems to be well sustained and free from any unpleasant after effects.

From the experiences quoted, it seems safe to conclude that the new drug is a remedy of real value for controlling insomnia and pain, and that it will enable us to get along with less of the narcotic pain allaying remedies. It worked better than morphine in many cases, and in others better even than morphine and hyoscine together. This report of experiences with it is presented in the firm belief that the new drug is well worth wide clinical trial.

I wish to thank Dr. J. C. Hornberger for valuable assistance in connection with the cases treated at the Philadelphia General Hospital, also Dr. Wright, Dr. Stieglitz and Dr. Messmer for permission to present reports of their cases.

REFERENCES.

1. Tiffeneau: La Règle de Richet et le coefficient de partage de Meyer et Overton dans les hypnotiques du groupe de Véronal. I. Série Allyee. *Comptes rendu des Séances de la Société de Biologie.* Séances du 19. March, 1921, Bd. 84, No. 11, p. 540.

1909 Chestnut Street.

NEW INSTRUMENTS USED IN NOSE AND THROAT AND PLASTIC SURGERY.*

By J. Eastman Sheehan, M. D., F. A. C. S.,
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Plastic Surgeon to the Public Health Hospital No. 38, New York; Associate in Laryngology, New York Post-Graduate Medical School and Hospital; Assistant Surgeon to the New York Eye and Ear Infirmary, etc.

NEEDLES FOR SUTURING THE PILLARS OF THE TONSILS TOGETHER.

The idea of using an instrument which would act as a tongue depressor and also to enable one to suture the pillars of the tonsils together was conceived some two years ago in Europe while experimenting with the epithelialization of the tonsil cavity. (Fig. 1.) There are two needles for suturing, one right, the other left. The small dip in the distal end of the shaft so pushes the tongue out of one's way that a firm, deep and low suture can be made with ease in the posterior pillar of the faucial tonsil. After the posterior pillar is pierced, the needle pierces the anterior pillar and is brought out near the membrane of the alveolar eminence, thereby insuring one of a firm suture hold. The needle is then turned completely upon its own axis and by so doing the pillars approximate and the instrument locks itself in the tissues: a small tenaculum catches the thread from the eye of the needle, and the instrument is retired.

AN APPARATUS TO SIMPLIFY THE REMOVAL OF A SKIN GRAFT OF THE THIERSCH VARIETY.

This is the Sheehan-Kilner apparatus. The nonhairy portion of the skin is used in removing the graft, generally the front aspect of the forearm or the anterior inner aspect of the upper arm or the front and inner aspect of the thigh, etc. The method, which is in general use today in removing such skin grafts, is as follows: After the skin is sterilized and moistened with saline, two blocks of wood are placed say six to ten inches apart, transversely to the limb, and the skin made taut by pulling the blocks of wood from each other, as firmly as possible, the skin between being cut by a razor or Thiersch graft knife. The method is an awkward one, requires one to be well versed in the technic, and owing to the bellying of the skin between the blocks, many times results in a poor graft of uneven thickness.

The apparatus here shown (Fig. 2) makes the removal of the graft much easier, is simple, produces the minimum amount of bellying of the skin, and is quite reliable. The small crossbar teeth give one a firm hold on the area of the skin to be used, a small amount of pressure from above pressing the bars apart produces even stretching of the skin; the ratchet locks the apparatus at the desired degree of tension and the instrument is steadied by the hand on the upper part, the other hand being used in cutting the graft.

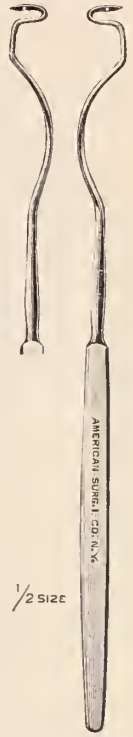

Fig. 1.—Needles for suturing pillars of the tonsils together.

A SET OF SCALPELS.

The scalpels as here shown (Fig. 3) are used by me in my plastic work. The larger ones are used for the making of tube pedicles, incisions for the removal of bone and cartilage, and excising scars. The other various smaller ones are used in the finer work about the eyes, nose, face and neck. The

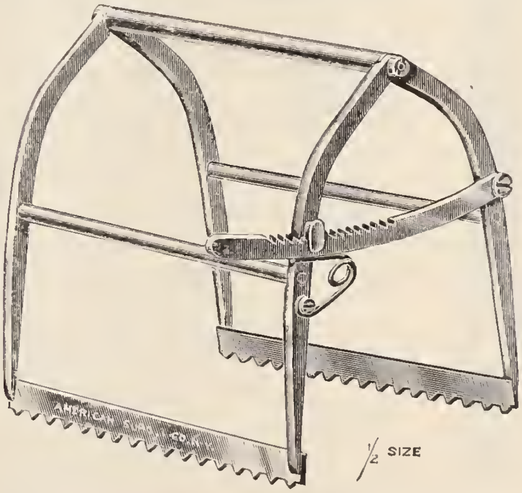

Fig. 2.—Sheehan-Kilner apparatus for facilitating the removal of a Thiersch graft.

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*Instruments presented before the Throat Section, New York Academy of Medicine, November 24, 1921.

handles are purposely made stubby, to insure an easy yet firm and well balanced grip.

BONE CHISELS.

A set of bone chisels, Nos. 1, 2 and 3 are shown in Fig. 4. The smaller chisel, No. 1, I use particularly when I elect the external operation for the removal of a bony hump from the nose. It also has many other uses. The No. 2 chisel is used in removing an osteoperiosteal graft from the tibia. Chisel No. 3 is used in removing an osteoperiosteal graft from the ilium. The reverse sides of the chisels are flat and smooth, except at the distal ends, which are slightly curved. The face of the tool has a sharp cutting surface. The object of curving the distal ends is that when the graft is gradually removed from its host it breaks forward, making an even thickness graft, thereby insuring the minimum amount of mutilation to the base. In removing nasal humps the smaller chisel is particularly serviceable, as it is quite impossible to chisel deeply into the tissues, thus preventing the removal of more of the bone than is necessary.

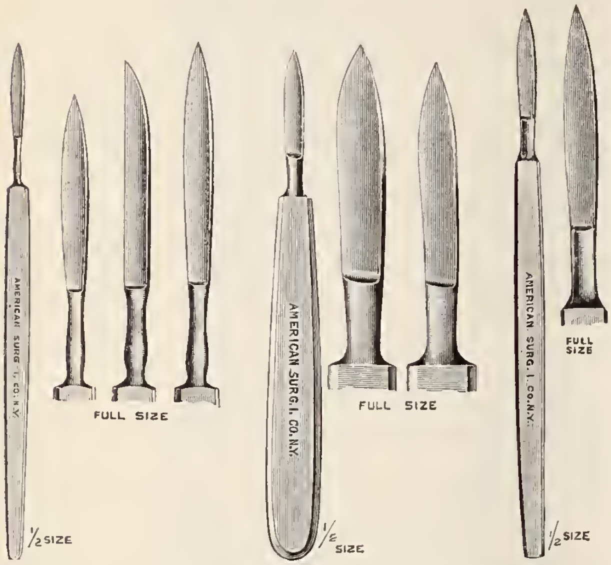
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Fig. 3.—Scalpels used in plastic surgery

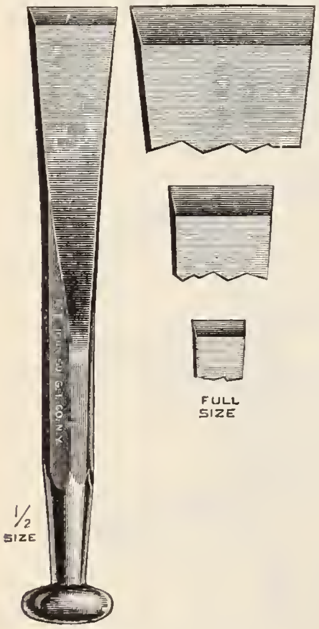

Fig. 4.—Set of bone chisels.

SHEEHAN'S MODIFICATION OF THE GILLIES SUTURE FORCEPS.

The idea of combining a suture forcep which embodies the property of scissors and which enables one to tie was conceived from the fixation scissors of Kocher, of Berne, Switzerland (Fig. 5). Sewing up after a plastic operation many times takes as long as the surgical procedure itself, even in the hands of the experienced, so that any instrument which enables one to become more dextrous and smooths his technic, is not only time saving to the surgeon but also of outstanding importance to the patient. In using the instrument the no touch technic can be nicely carried out in sewing up. One is able to suture, tie and cut without releasing the instrument from his grasp. The forceps have been so improved that a better hold is obtained from the long shaft and the needle is held more firmly by having the mouth of the instrument approximate more accurately.

24 East Forty-eighth Street.

AFTERTREATMENT OF SUBMUCOUS RESECTION.

By David H. Jones, M. D.,
New York.

Following all submucous resections, instead of packing the nostrils with vaseline gauze I have made use of a preparation called surglet, which is mosquito netting impregnated with paraffin. This is cut in strips two inches by four inches and folded upon itself to make a compress, one end being cut at an angle of forty-five degrees. At the completion of the operation the flap of mucous membrane on the side of the incision is cut along the floor of the nostril for about two inches, and the patient is instructed to blow his nose, which approximates the flaps in position. With a bayonet forceps the compress, pointed end to pharynx, is placed in each nostril taking care that flaps are not displaced at the time of insertion.

The patient is instructed to blow his nose gently every hour to blow out the blood and serum. The compress remains firm for two or three hours keeping the mucous membranes in apposition and allowing the patients to breathe through the nostrils. At the end of six hours, if the compresses are still in place they are removed and patient is instructed to blow his nose as before.

This method has been used in over four hundred cases, private and clinical, with excellent results. Its advantages are that the patient can breathe through the nostrils while the compress is in place and does not suffer the pain caused by packing the nostrils tightly with vaseline gauze. There is less trouble from hemorrhage and hematoma as the patients blow the blood and serum out of the nostrils. Cutting the flap allows the membrane to approximate better.

114 East Fifty-fourth Street.

Rail Fibres in Normal Human Skin.—Hans Homma (*Wiener klinische Wochenschrift,* February 16, 1922) describes very delicate black impregnated fibres, which can be differentiated from collagen and elastic tissue by the Maresch-Bielschowsky stain: 1, at the transverse sections of the ducts of the sweat glands, and 2, in the walls of the small arteries, and 3, in the subepithelial layer. These fibres stand in constant analogy to the fibres in parenchymatous organs.

Local Use of Ether in Chronic Effusions in the Knee Joint.—H. L. Rocher (*Presse médicale*, February 15, 1922) recommends tapping of the joint followed by injection of ether, which is allowed to act for five minutes. Under procaine anesthesia and after shaving the skin locally, a short bevelled needle of two millimetres diameter is inserted into the joint through one of the peripatellar culs-de-sac, the joint emptied of fluid under gentle pressure, and pure ether injected with a Luer syringe until the joint is slightly distended. The needle is then closed with a finger tip and the ether worked about in the joint with the other hand so that it enters all folds and recesses in the joint. At first moderate pain is produced, but in a few minutes anesthesia of the synovial membrane follows, so that general anesthesia is not required. After the ether has been in the joint for about two minutes it is withdrawn, bringing with it a certain amount of synovial fluid. From five to twenty mils more of ether are then injected, without forcibly distending the joint. After ether has been injected and worked about for about five minutes altogether, the joint is emptied, the needle withdrawn, and a compression bandage applied. In the following two days there results a slight reaction manifested in pain, which disappears within twenty-four hours, and some distention, which disappears permanently within a week. The treatment has been used with marked success in both traumatic, rheumatic, and tuberculous chronic effusion of the knee. In a rheumatic case in which one knee was treated by this method and the other by simple puncture the advantages of the use of ether were clearly shown. In many instances the ether treatment seems to check and cure the preexisting process of chronic synovitis. Where pain and impaired movement still persist the treatment should be supplemented with local cauterizations, tincture of iodine, and thermotherapy, which will then restore the function of the joint more or less rapidly. In hyarthrosis of tuberculous origin the joint should be immobilized in a padded gutter splint; the ether treatment will then rapidly dry up the joint. In one case a traumatic effusion in the knee and popliteal cyst were simultaneously cured by the ether treatment.

Treatment of Pericarditis with Effusion.—Carl A. Hedblom (*Minnesota Medicine*, January, 1922) finds that this condition occurs most frequently in association with acute rheumatism, although other primary conditions may be pleurisy, pneumonia, acute general infections, tuberculosis and chronic nephritis; in children it usually follows pulmonary or pleural infection. The most characteristic symptoms are increased precardiac dulness, feeble or absent heart sounds, absent apex impulse, small rapid pulse, dyspnea and cyanosis; the onset may be insidious and the symptoms latent. Exploratory pericardiocentesis may be necessary to establish the diagnosis of the presence and nature of fluid. When this is done with a short hypodermic needle which infiltrates the tissues with novocaine as it enters, it is as simple, painless, and harmless as aspiration of the pleural cavity. The point of election for aspiration seems to be in the region of the left mammary line, fifth interspace, just inside the left border of dulness. In case aspiration there is negative, alternative points are beneath the xiphoid process at the left sternal border, and at the right sternal border of the fifth interspace. A negative aspiration at any one point does not exclude the presence of fluid. A serous fluid is usually sterile but it may be infected; a purulent exudate is usually infected, but it may be tuberculous, or secondary to malignant disease. A sterile exudate, unless persistently recurrent, should be evacuated by aspiration; an infected exudate should be evacuated by pericardiotomy after resection of the cartilage to secure wide dependent drainage.

Dilatation of the Esophagus in the Treatment of Hiccough.—V. Cristol (*Presse médicale*, February 11, 1922) refers to a case of hiccough of twenty-four hours' duration, in a man aged fifty-one years, in which, while attempting to pass a tube into the stomach, he noticed a condition of esophageal spasm at the aorticobronchial level and also at the cardiac opening. Although various food remnants were brought up from the stomach through the tube, the author believes this fact did not account for the cessation of hiccough. The passage of the large rubber tube caused the spasms of the esophagus to disappear, and this accounts for the relief from hiccough better than the mere emptying of the stomach. Fulde is quoted to the effect that a stomach tube left *in situ* for a few minutes constitutes the best means of relieving hiccough. Spasms of the esophagus appear to be a factor in the production of this disorder.

Convalescent Serum in Scarlet Fever.—T. Mironesco and O. Sager (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris*, February 2, 1922) report twenty-one severe cases of scarlet fever treated with the serum of scarlet fever convalescents, with good results. From sixty to 100 mils of serum was collected from each otherwise healthy convalescent in the fourth week after defervescence. In order to avoid depending upon any single serum in which only a feeble immunizing reaction might have taken place, the mixed serum of several convalescents was used in the treatment. After making sure that the serum collected was sterile, it was inactivated by heating at 56° to 58° C. for one hour and then kept cold and in darkness until used. The amount injected was twenty to thirty mils a day, or more if necessary, usually given intramuscularly. The cases treated were severe in having high fever, an intense eruption, more or less marked symptoms suggesting malignant scarlet fever, and a pronounced leucocytosis—twenty to thirty thousand. Most of these cases were in adults. Injection of twenty-five to thirty mils of the serum usually caused within twenty-four hours a fall of 2° C. in the temperature and improvement in the pulse and general condition. In six cases two or more injections were given. Many of the injections were administered on the third day of the disease, though some as late as the eleventh day. All of the twenty-one patients recovered except three, one of whom had received sixteen mils of serum, while the other two showed pronounced miliary tuberculosis at the autopsy. The action of the serum is ascribed to its content of scarlet fever antibodies. The leucocytosis shows a reduction following the treatment.

Proceedings of Societies

NEW YORK NEUROLOGICAL SOCIETY.

Joint Meeting with the Section in Neurology of the New York Academy of Medicine, November 1, 1921.

Dr. Kennedy Foster, President of the Society, and Dr. S. P. Goodhart, Chairman of the Section, presided.

Case of Fourth Ventricle Tumor with Surgical Intervention.—Dr. I. S. Wechsler presented this case. The patient was a young housewife, aged twenty-nine. She was first seen on May 25, 1921. At that time she complained that, beginning suddenly in November, 1920, she suffered from dizziness and spells of momentary darkness before her eyes. The attacks of dizziness lasted a few seconds, she felt like falling, occasionally did fall, though to no particular side. The dizziness was especially apt to come on when she got up on a chair. To overcome the vertigo she had to hold her head in a rigid position. The spells of dizziness used to disappear for a few weeks, then set in again. Frequently she would suddenly lose her vision for periods lasting from two to five seconds. She had gained thirty pounds in weight and her menses had become irregular, prolonged and profuse. She was being treated for a psychoneurosis by the man who first recommended her to come to Dr. Wechsler.

On the first examination there was a choked disc of five diopters. Physical examination showed a somewhat acromegalic face, inequality of pupils, LR, and bilateral choked disc. The diagnosis made was tumor of the fourth ventricle—tumor because of the choked disc, and fourth ventricle because of remissions, of the need of holding the head rigid to overcome the vertigo, which was interpreted as a modified Bruns symptom, and because of the absence of other localizing signs. Tumor of the quadrigeminals was ruled out because of the absence of pupillary signs and of ocular palsies; tumor of the pituitary was also thought unlikely, despite the acromegalic face, gain in weight, and menstrual disturbances. Cysticercus was considered.

The patient was admitted to Mt. Sinai Hospital. An eosinophilia amounting to seven per cent. weighed in favor of a cysticercus. The x ray showed a normal sella and no signs of pressure. Dr. Elsberg performed a suboccipital craniotomy and found a tumor filling the fourth ventricle. It was adherent to the floor and sides and to the calamus scriptorius. An attempt to remove a piece of the tumor resulted in bleeding which, owing to the dangerous location, necessitated a rapid retreat. The tumor appeared to be either a glioma or an ependymoma. For a short time after the operation her condition remained unchanged, but later some dysarthria developed, with a little staggering, vomiting and slight optic atrophy. She was discharged from the hospital within a few weeks. Five months after the operation the patient was still living. She had improved somewhat.

The interesting points considered were: 1. The diagnosis of fourth ventricle tumor during life and its verification at operation, based on a modified Bruns symptom and choked disc. 2. The absence of all signs of fourth ventricle tumor, such as pressure symptoms on the medulla, pons, cerebellum and cranial nerves. Particularly noteworthy were the absence of vomiting, headache, rigidity of the neck, polyuria or glycosuria, and vagal symptoms.

The Primitive Spinal Integration of Movement in Vertebrates.—Dr. Walter M. Kraus, in a paper on this subject, set forth a principle, hitherto undescribed, of the physiology of movement and posture. He said that at the present time movements were described in such terms as extension, abduction and internal rotation. In other words activity controlled by a neuromuscular mechanism was being described in terms of the muscular part of that mechanism alone, leaving out the neurological element of that movement and its control by the spinal cord and its peripheral nerves. In describing a complicated movement guided by integrations of the nervous system at levels higher than the spinal cord, a consideration of the final neuromuscular mechanism was omitted. In other words the foundation of the control of movement by the spinal cord was left out when such words as flexion, extension and abduction were used. It would seem wise to add to the terms describing muscular movements other terms which would give a notion of the embryology of these muscles as well as their innervation.

The nervous system was unquestionably built up of a series of physiological levels, of which the higher or more recent ones, phylogenetically speaking, carry out functions which were different from the lower ones. In Dr. Kraus's opinion there must be some conception of the integrating action of the lowest levels in order to interpret the higher levels. In other words, it was necessary to know how the spinal cord integrated movements in order to understand how such higher integrations as the cerebellar acted and ultimately to understand why it had become necessary for these higher integrations to appear at all. In order to examine this question of the existence of integration of movement of the spinal cord, it became necessary to consider in detail the general plan of peripheral nerves, the general plan of the innervation of muscles by them, and the embryological grouping of muscles.

A typical thoracic spinal nerve, having nothing to do with the limbs, showed a number of divisions after it had been made up of the posterior and anterior spinal roots. The common trunk so formed divided into an anterior and a posterior division. The anterior division divided further into a lateral and an anterior branch. Furthermore, the lateral branch divided into two, a dorsal and a ventral. As far as the axial musculature was concerned, the portions of it developed from the ventrolateral portions of the embryo were supplied by the anterior division and its branches, while the posteromusculature was supplied by the posterior branches. Thus a simple scheme resulted from a physiological viewpoint, in the notion that general movements of extension were guided by the posterior division, while flexion and lateral movements were guided by the anterior division. When this was applied to the limb plexuses, two theories presented themselves. The limb plexuses did not include any part of the posterior division. One theory assumed that the plexuses were made up of the entire anterior division, the other that they were made up entirely of the lateral branch of this division. Dr. Kraus said he chose the theory which stated that the plexus was made up solely of the lateral branch. The lateral branch divided into the dorsal and ventral branch. The primitive extremities of the embryo were flattened buds having a dorsal and ventral surface. The premuscle mass on the dorsal side gave rise to muscles, the majority of which, in the adult, had an extensor function. The premuscle mass on the ventral side of the bud correspondingly gave rise to muscles, the majority of which had a ventral function. When considering the simplest function of a muscle, it was found that certain of them had a function opposite to that which would be expected from a knowledge of the side of the limb bud (ventral or dorsal) from which they developed; for example, the iliopsoas group developed from the dorsal muscle mass of the lower limb bud. However, they had a ventral function, that is, flexion.

Returning to the question of innervation, Dr. Kraus said that the embryology of the muscles was beautifully emphasized by the innervation of these muscles. The nerves of the brachial and lumbosacral plexuses divided into two definite groups; one of which was posterior or dorsal and the other anterior or ventral. In the arm the ventral branches of the brachial plexuses innervated the subclavius and pectoral muscles as well as all the muscles supplied by the musculocutaneous and ulnar nerve. When a detailed table of muscles was made, based upon whether they had been derived from the dorsal or ventral aspects of the limb bud and whether they were supplied by dorsal or ventral branches of the limb plexuses, it was found that those muscles which developed from the dorsal layers of the bud were supplied by the dorsal branches of the limb plexus. The analogy to the condition in the axial musculature was obvious.

The nerves derived from the brachial plexus were divisible topographically into two large groups, one ventral and the other dorsal, which, in turn, supplied muscle groups which were ventral and dorsal in origin (Paterson). The functions of these muscles, as in the case of the iliopsoas previously mentioned, a muscle which would be expected to have an extensor action had in reality a flexor action. If the muscles activated in any given movement were grouped merely on the basis of their activity as muscles, leaving out of consideration the origin of their embryology and activating nerves, the division of these nerves and their end organs, the muscles, into a large ventral and dorsal group would be left out entirely.

As an illustration, the process of stepping was considered. If the extreme forward movements of the leg were represented the forward movement was carried out by the iliopsoas, quadriceps and tibialis anticus muscles. Though this forward movement of the leg as a whole was spoken of as flexion, it was of dorsal origin since all the muscles which carried it out were of dorsal origin. The carrying backward of the leg was brought about by the hamstrings, gastrocnemius and soleus group and the tibialis posticus, all muscles having a ventral innervation and being of ventral embryological origin. The movement of extension of the leg as a whole at the hip was ventral in origin. In the associated movements of the arms and legs, when the left arm was forward and flexed, the left leg was extended at the hip, flexed at the knee and extended at the ankle. The arm and leg on the same side were acting oppositely, in that the arm was flexed while the leg was extended, and the arm for example was forward while the leg was backward. In this example the arm and leg on the same side were both directed by ventrally innervated muscles, so that the notion that the arm and leg go in opposite directions on the same side must be reversed when the neuromuscular mechanism was considered as the basis of movement.

It was proposed that to the words now used to indicate the activity of a muscle, such as flexion, abduction and extension, two words be added, namely: ventrad and dorsad, which would serve to indicate three things: 1. The embryological origin of the muscle. 2. The nerve supply of the muscle (ventral or dorsal branches). 3. The primitive direction in which the limb was carried by that muscle. By adding these terms movement would be described in terms of the neuromuscular mechanism, instead of leaving out the activity of the nervous system entirely.

The primitive integration of movements of the spinal cord was seen to be one which threw into activity the muscles which developed together and were innervated together. This simple movement of a group of such muscles must be brought about by a correlation mechanism within the spinal cord, and formed the foundation of movement. So simple a movement as could be brought about by the simple activation of large groups of what were primitively ventral or dorsal muscles, was obviously insufficient for the needs of animals. Further and different integrations of movement became necessary and so not only the spinal cord but the more recently developed portions of the nervous system came into existence, in order to make possible these new and more complicated patterns of associated movements.

Dr. Smith Ely Jelliffe, in opening the discussion, said that he felt quite certain that Dr. Kraus had emphasized a method, or a new method of an analysis of motion, and whereas for himself the embryological argument always lagged behind the phylogenetic argument, he would like to have him, in his further expositions of the situation, link up the phylogeny of these movements and show wherein they conformed to the present embryological schemes. Then he thought a certain number of the difficulties that he himself had suggested, that he found himself enmeshed in, would perhaps be clarified.

Dr. Kraus, in reply to Dr. Jelliffe's remarks, said he thought the phylogeny of the matter was the only ultimate way to decide it. He did not think, however, that it was necessary to give the "why" of these things to emphasize the facts. The facts remained. He believed, that one should speak in terms of the neuromuscular mechanism and not of muscular mechanism only.

Therapeutic Experiences of Myasthenia Gravis. —Dr. Charles L. Dana read a paper on this subject. He stated that the prognosis in this disease as generally given was very bad; according to Oppenheim twenty-six out of thirty-eight patients died; Dr. Hun found that most patients died in from one to three years; Dr. M. Allen Starr found that in about forty-five per cent. of the cases collected by him the patients died within six months. Dr. Dana stated that his experience had been quite different, and he felt he ought to record it. He had had under observation fourteen cases in the last twenty years; he had not been able to follow up the histories of all of them. Some of the patients had died from natural causes, but in general he could say that none of them had died of the disease while under his observation, and he had had them under observation for from one to seventeen years.

Dr. Dana thought that the better prognosis in these cases was due in part at least to the treatment which he had employed, which consisted of massive doses of strychnine combined with rest and elimination. The doses reached in some cases one third grain given hypodermically two or three times a day. He also referred to the frequency of prodromal attacks; in fifty per cent. of his cases, the serious attacks were preceded by short attacks lasting only a few weeks and characterized by some ocular symptoms and bulbar weakness. In some cases these prodromal attacks were not followed by any other attack for many years; in one case as long as seventeen years elapsed. Dr. Dana thought it quite probable that mild abortive attacks of myasthenia gravis characterized by diplopia and slight exhaustion of the bulbar centres, were not infrequent. In some cases the prodromal seizure was simply an ocular one and one of the causes of casual ocular palsies of permanent type was undoubtedly myasthenia gravis. This fact was not recognized in the systematic works on ophthalmology. Dr. Dana referred to myotonia as an occasional complicating symptom of myasthenia. He thought the disease toxic and endogenous and one that affected both motor neuron and muscle. He had seen no result of note in endocrine therapy.

Dr. Bernard Sachs in discussing Dr. Dana's paper said he was willing to endorse this rational therapy. He did not think there was anything surprising in the fact that he had employed strychnine. In the cases he had seen at the hospital during the past ten years the uniform treatment, particularly for the bulbar symptoms, had been the use of strychnine, but of course it had not been employed in any such doses as Dr. Dana recommended, and he should be very glad, when the opportunity presented itself, to put that high dose to a further trial. Dr. Sachs thought that Dr. Dana's experience had been an extremely fortunate one. Of all the cases in which he had made the diagnosis of myasthenia gravis pseudoparalytica, only a few patients had recovered or had remained alive long enough for him to record a temporary recovery. He wondered if Dr. Dana had not experienced much the same thing. First of all, the disease that some styled myasthenia gravis pseudoparalytica included a number of rather discordant types of disease, and in view of the experience of the past few years with various forms of encephalitis, not only encephalitis lethargica, he wondered whether they should not all be inclined to think that some of the cases labeled myasthenia gravis were really some form of encephalitis.

Dr. L. Pierce Clark said that a number of years ago at the National Hospital for Paralytics and Epileptics, Sir William Gowers was very keen on the use of strychnine in myasthenia gravis. He had been particularly impressed with the enormous advantage that Gowers had gained from such administration. Later he had the opportunity of noting cases in the service of Dr. Starr at Vanderbilt Clinic. He saw advantages in the foreign cases but did not recall advantages obtained on this side with either small or large doses. He had continued to use strychnine for a period of two or three years, beginning with small doses and running up to a fourth of a grain. He would like to ask Dr. Dana, who had had considerable personal experience, how he explained the rational therapeutics of the strychnine, if this was some form of glandular disturbance (which now seemed more than likely) how did the strychnine operate against an organic conductivity of the systemic values? He had been astonished to note the enormous suggestibility of these patients and the neurotic attitude they took toward the disease. Several months ago he was asked to see a patient, not because of the myasthenia gravis, but because there was possibly a neurosis superadded. The diagnosis seemed quite correct and everything had been done for the patient that was possible. Dr. Clark suggested that the patient get a change of environment by taking a rest in the country, and he was much surprised when a few days later the man's wife reported that he was walking two miles, was engaging in all sorts of activities, and that everything but his speech (which was predominantly bulbar in type) was enormously improved. Simple advice had evidently impressed the patient and had much more to do with the betterment of his condition than any special therapy that had been undertaken.

Dr. Smith Ely Jelliffe said that while listening to Dr. Dana's paper his thoughts had been running along the lines that Dr. Sachs had so well emphasized in what he said: that whereas a nuclear type of reaction called myasthenia gravis could be predicated, shading off from such a picture a great number of semi, demi types could be obtained, some of which undoubtedly belonged in the group which Dr. Sachs had suggested might be a varying group; also others that heretofore had been called periodical palsies, and a whole group of phenomena related to irregular muscular reactions located chiefly in the medullary nuclei. Of course if, with a certain trend of mind, some were likely to lump all these things together and speak of a disease *sui generis,* then he thought Dr. Dana's attitude of mind was quite justified. However, if one was inclined to see nuclear types and the divergent types and a whole group of situations which clinically were grouped about very definite symptoms, it seemed to him the results which had been reported upon were quite comprehensible.

Dr. Dana had spoken of the endocrinal situation. For himself, Dr. Jelliffe said it seemed to him that was entirely too broad and glaring a type of generalization. If the particular group of glandular involvements had a certain specific action, either on one or the other branches of the autonomic nervous system, then an endocrinal disorder could be predicated; that is, it might be said: "Here is predominantly a disturbance in the muscular mechanism which is doubly innervated." The sympathetic arc of the vegetative mechanism, it seemed to him, was the one that was most primarily involved in the nuclear types of myasthenia gravis. If that was so, there was a good rationale why strychnine should be of value in that type, because it was, of all the vegetable alkaloids, the most powerful stimulus to the sympathetic branch of the vegetative nervous system. That was also the reason why calcium was therapeutically of value, and wherein sometimes the myasthenia gravis cases were closely checked up on the parathyroid.

Dr. **Charles E. Atwood** said he wished to call attention to one fact in relation to the disease. Of course all realized that these cases were subject to remissions and that the disease renewed itself frequently by fatigue. Possibly the renewal of the symptoms was due to the suboxidation which took place in fatigue. He had a case of myasthenia that had lasted since 1907. The patient had done best with hygienic symptomatic treatment and small doses of strychnine. The myasthenic reaction was one of the most reliable tests, perhaps, in differentiating myasthenia gravis from other diseases.

Dr. **Foster Kennedy** said his experience in the matter had been that there was rather a difference of prognosis in the subjects who were young; i. e., in the subjects who were under forty and in the subjects who were over forty, it being decidedly worse in those who were in their twenties. The disease, as he had seen it, had run a much shorter course in the young than in the middleaged or aged. He had been fortunate enough to see a series of autopsies in cases of myasthenia gravis, with the extraordinary chance that in five of them an enormously enlarged thymus existed. This thymus was not so very great as regards glandular bulk, but it was great as regards to glandular expansion. The thymus existed as an object perhaps two thirds the size of his hand, stretching down over the pericardium—an extraordinary phenomenon, one which certainly could not be without significance in the disease, though its exact correlation with the symptoms he was not able to state.

Dr. Charles L. Dana said he was greatly obliged to the gentlemen who had joined with so much interest in a discussion of a subject which was certainly an interesting one and one which seemed to him to deserve further and closer scrutiny.

He was also glad to hear him refer to the centre for the nerves that supplied these organs, the corpora quadrigemina in that region. From the long fasciculus which developed in the embryo, the nerve supply could be traced down to the thyroid and that fasciculus could be traced, getting down much later to the adrenals, at least comparatively speaking; so that the thyroid came into the circuit quite a good deal ahead of the adrenals, and it seemed to him if the embryo was observed very carefully at this time, that a good deal of information could be obtained in regard to the functions of the thyroid and the adrenals in relation to the nervous system.

Then Dr. Timme had raised a large question as to whether the physiologists had any advantages over the clinicians as workers in the realm of science. He suggested that inasmuch as there were differences of opinion among clinicians and also differences among physiologists, that they were both on the same plane in that they had differences; but it seemed to him that the physiologists at least had this advantage over the clinicians: that they worked on material and concerned themselves with problems which were capable of demonstration and capable of being inquired into under conditions which were more or less controllable. For instance, the subject that Dr. Strauss referred to in Dr. Timme's remarks, the question of syncope being due to exhaustion of the adrenal because of feeding the thyroid, Dr. Cannon said that it seems to him that there was a number of wholly unwarranted assumptions in that statement. In the first place, it was possible to remove both adrenal glands from animals and they would live for hours. In fact, they had lived for three or four days, with no drop of blood pressure whatever. It was a common assumption that the adrenal medulla was necessary for the maintenance of blood pressure, but that was not a demonstrated fact. In all probability the fall of blood pressure that occurred finally after removal of both adrenal glands was a consequence, possibly, of the removal of the adrenal cortex rather than the medulla; a general weakening of the whole animal. At least, it was possible to remove practically all of the medulla from the adrenal glands, leaving the cortex, and the animals would survive for a long period; and then on removing whatever was left, they promptly succumbed.

Another question that Dr. Timme brought up was why individuals did not get into a regular cyclone of sympathetic activity, because the sympathetic stimulated the adrenal, the adrenal stimulated the sympathetic, and so on, until there was a catastrophe. That might occur if the adrenal gland was subject to adrenal secretion, but there was no evidence that it was, and there was quite a bit of evidence that it was not. It had a peculiar nerve supply; it was not enervated by the sympathetic as the blood glands were enervated by the sympathetic. So that the possibility of a vicious circle being started was not present, and, as the record showed after an afferent nerve was stimulated or the splanchnic nerve was stimulated, the heart rate went up promptly, beginning in eleven or twelve seconds, and in perhaps a minute and a half after the stimulation had ceased the heart rate was down where it was before. In other words, this vicious circle did not occur, and it did not occur because the secreted adrenalin did not in turn stimulate the secreted cells to produce more adrenalin.

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Miscellany.

Untoward Effects of Lumbar Puncture.—G. Milian (*Paris médical,* February 11, 1922) notes that in subjects already suffering from some serious brain disorder, such as meningitis, cerebral hemorrhage, and fractured skull, lumbar puncture causes little trouble. The same applies to tabetics, who show a remarkable tolerance to puncture, probably owing to brain analgesia. Subjects with cerebrospinal hypertension seem to bear it better than those with low pressure. In cases of anxious melancholia with intense reactions and in cases with delusions of persecution lumbar puncture may be very harmful. The degree of reaction after puncture has nothing to do with the amount of fluid withdrawn. The headache and vomiting seem due rather to continued escape of cerebrospinal fluid through the opening in the dura mater made at the time of puncture. In the case of a young man with severe headache following a puncture two days before a large wet area was even found on the sheet, due to escape of fluid along the needle track. The symptoms generally stop five days after puncture, giving exactly the time required for histological repair of an aseptic wound. A hole in the dura mater examined after death thirty-six hours after puncture seemed as though made immediately before. Reduction in the escape of fluid after puncture is obtained by using a needle not exceeding one millimetre in diameter, by making the least possible number of holes in the dura, by never aspirating the fluid (except for the first few drops), by carrying out massage of the overlying skin and muscle with a pledget of cotton, making deep pressure, and by having the patient lie at once in the knee chest posture, with the back arched downward, and remain in this position for ten minutes. Thereafter the patient should lie face downward for twenty-four hours, with the head lowered below the pelvis by placing a brick or two at the foot of the bed. If the prone position becomes irksome the patient may turn on his side, preferably on the side opposite that of the puncture. No dressing over the puncture is required, except perhaps a little gauze held by adhesive; collodion is particularly objectionable. In cases where headache and vomiting have already set in, the horizontal position is alone capable of bringing relief. The only drug that will relieve the headache and enable the patient to get up is morphine subcutaneously in doses of 1.5 centigrams or more, morning, noon, and evening. Additional administration of a liquid combination containing five centigrams of extract of opium and two grams of bromide is sure to bring considerable relief from the symptoms and enable the patient to return to his ordinary duties, at least in part. Where headache, pains and vomiting continue ten or twenty days or more a hysterical element is constantly involved, and the symptoms can be made soon to disappear by suggestion.

Familial Pleonosteosis.—A. Léri (*Presse médicale,* January 7, 1922) describes a dystrophic disorder characterized by premature and excessive development of all the bones that are preceded by cartilage. There occurs a premature fusion of the epiphyses with the diaphyses of the bones, with the result that the bones only develop transversely and fail to grow in length. The consequent bony deformity causes abnormal postures of the extremities, the subject being, for example, unable to bring the elbows alongside the trunk when the hands are in contact with the legs. There is also diminished mobility of nearly all joints, causing, in particular, reduced power of rotation and lateral motion. The same process of osseous hypertrophy, progressing further in adults, produces exostoses on the fingers and toes and ankyloses. The disorder is congenital and hereditary. The limbs are short and pudgy, the arms may be slightly shorter than the forearms, and the little fingers are small and curved in. Some of the patients show Mongolian facial traits, and somewhat resemble Laplanders. That the condition is not of syphilitic origin is shown by the absence of specific stigmata and the negative Wassermann reaction. Achondroplasia differs from it in being seldom familial and in being almost fully established at birth.

Important Points in the Diagnosis of Pulmonary Tuberculosis.—Roswell J. Pettit (*Illinois Medical Journal,* December, 1921) finds the history is the most important single item in the case study. The physical examination should be complete and should include not only the chest but the whole body; frequently bad teeth or diseased tonsils may produce many signs of phthisis, as may also hyperthyroidism. He agrees with Lawrason Brown that auscultation is more important than inspection, and the detection of râles following cough is the most important procedure in the detection of early phthisis. Temperature and pulse curves are most important guides to the presence of general intoxication. Repeated sputum examinations should be done and also an x ray examination, especially stereoscopic plates.

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A Urologist's Views on Syphilis

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New York.

In the study of syphilis we soon become familiar with the usual sequence of clinical symptoms of the disease, which has led to the designation of well defined stages, characterized by certain specific manifestations. But we also become aware of the fact that striking variations from these generalities occur in the most pronounced contradictions: as, for instance, when the primary stage, after its expiration, makes its reappearance during the secondary stages in the form of a relapsing chancre, which, together with other clinical evidences of the second stage, merges these two stages into one; again, when a precocious tertiary manifestation is precipitated during the secondary period. Thus, also, are there variations in the serological findings, contrary to, in place of being parallel with the clinical situation. What one of us has not seen instances of active clinical manifestations of this disease and negative serological findings; while examples of the reverse of this situation are too numerous to mention. The spinal fluid, too, manifests certain regularities and irregularities in keeping with the departure from absolute conformity.

About three or four per cent. of cases examined in the primary stage, it seems, show some positive reaction of spinal fluid, whereas, in the standardized regular course the disease is not expected to be revealed at all in the spinal fluid at this stage, as it is commonly found that the blood serum does not give a positive reaction until from four to six weeks after the initial stage. In from twelve to fifteen per cent., even after treatment has been instituted, abnormal spinal fluid is demonstrated in the secondary stage (1). I shall leave it to others better qualified to do so, to speak more fully upon these particular technical phases of the subject.

Other fallacious generalizations we are constantly confronted with relate to the prevalence of the disease, on the one hand, and the outlook or prognosis under treatment, on the other. In order to give to these questions a practical consideration, let us discuss them under two separate designations, namely: 1. Diagnosis: influence of early diagnosis upon the control of the disease. 2. Treatment: effect of modern treatment upon the prognosis.

It stands to reason that the greater the facilities for diagnosis of any malady the more general will be its recognition. Therefore, in estimating the prevalence and control of a malady, other things being equal, the greater the facility in diagnosis the greater its (known) prevalence; that is to say, with an increased percentage of efficiency in diagnosis, a certain allowance must be made for such in determining the question of increased prevalence. That this generalization leads to misconception in the case of syphilis there is no doubt, for improvement in sanitary control and restriction has advanced along with means of diagnosis. One author (2), referring to the control of syphilis, states: "That in spite of the enormous amount of work done to prevent its dissemination (during the recent World War) it has greatly increased throughout the world," a generalizing statement which tends to mislead, and to fortify the conclusion arrived at by the same author that: "Its control and reduction are the only conditions we can hope to strive for, as eradication is not within the realm of human possibility." When we stop to think (and I have been in a peculiar position to observe it) the very situation which provided enormous efficiency during the war applied, for the most part, only to military areas and the military régime, and was at the expense of the civil or home conditions, the latter in some instances being seriously disregarded. For example, the prevalence of syphilis in London and Paris and other civilian centres was emphatically demonstrated, as is likely to be the case, by the number of extragenital infections. I recall many personal cases. One, a young aviator, ordinarily of not too circumspect behavior, being strictly forewarned by his comrades against the dangers of the denizens of Piccadilly, who, in one of the most prominent hotels in London, was shaved by the hotel barber once only, it being the rule that he shaved himself, and the exception to this rule resulted in a chancre upon his chin. Another case was a young, innocent lad, who, in the language of

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the times, had been with great fervor three times over the top. On account of temporary indisposition, he was assigned to clerical work away from the field of action; during this period he cut his lip while sealing an envelope and a chancre developed thereupon. Another soldier boy consulted me concerning a hard chancre on his lip. He was a member of a troop that was being mobilized and during the process of train transportation was besieged at different station stops by patriotic feminine enthusiasts, many of whom had seized the opportunity to embrace him. The conclusion is that the disease seemed to have become strikingly prevalent, not in spite of, but on account of, existing conditions.

On the other hand, the fortunate law of compensation or regulation, namely, the facilities for early diagnosis, should tend to lessen the dangers of increased prevalence by virtue of earlier control and prompt cures. That such is the tendency is signified by the favorable statistics obtained of cases proved to be positively syphilitic in the primary stage and submitted to early treatment. The demand, therefore, is most emphatically for early diagnosis, which is necessarily correlated with early treatment.

In times past the practice was in vogue, according to some teachers, of excising a chancre at its inception, the theory being that in such manner constitutional infection might be headed off and propagation prohibited. Today, what is considered very much more to the point is the adoption of the most reliable means of modern technic to establish early diagnosis, to the end of prompt and curative treatment which may be well nigh abortive, and in that sense as useful in fact as was the idea of excision of the chancre in theory. For this purpose, therefore, careful laboratory observation for the Spirochæte pallida should be practised, as we know that these organisms can be found locally in the majority of cases; while we cannot expect to obtain confirmation by a positive blood reaction until after the expiration of from six to eight weeks, a period that might well serve a most useful purpose in the interest of elimination, instead of being lost time and opportunity for the disease to become more deeply rooted.

Dark field illumination attachment to the microscope affords means of searching for the specific organisms and where special laboratory facilities are not at hand any observer may become proficient in this technic with a little experience.

Promotion of the practice of early diagnosis cannot be too strongly urged; but it must be stated with equal emphasis that the beginning of treatment for the constitutional disease before a positive diagnosis has been adequately established, cannot be too strongly interdicted. The unscientific method of making a diagnosis by a therapeutic test, or beginning treatment in advance of diagnosis, is so fraught with the possibility of complicating conditions that one has but to reflect upon a case to appreciate its danger. In one patient a suspicious lesion develops. He is engaged to be married. One medical observer calls it a chancre; another says it is not. Finally, a third says he does not know, but advises the use of specific medication to prove its character. The result is obvious. The sore becomes well, but whether *post hoc* or *propter hoc* cannot be stated. Before the days of the Wassermann test this meant an absolutely indeterminate situation, so far as the social obligations of patient and medical adviser were concerned. Today it means the same, as our orthodox methods of treatment demand for the protection of the individual patient and of society at large, in the interest of the cure of the disease on the one hand, and the prevention of its propagation on the other, a series of negative blood examinations and more than one course of specific treatment, covering a minimum period of three, six or twelve months. That a conscientious medical adviser should beware of enforcing upon anyone this period of treatment and restraint, unless it is demanded by conditions warranting it, it is not necessary to dwell upon. Therefore, the rule should be: a positive diagnosis succeeded by immediate treatment. This applies with equal force to all stages of the disease. As has been set forth the proper course in the primary stage has become a more or less simple one. Nor is it less so in other stages provided positive blood reaction and positive clinical symptoms are existent; or one or the other of these evidences in sufficiently convincing degree. In the Wassermann test we have a guide of such high efficiency that it is beyond question the greatest of all agencies for the hopeful outlook of reducing the prevalence and in controlling the propagation of this ancient disease.

One observer (3) reports, from an examination of the blood serum in 3,000 cases, a conformity between two different laboratories in the Wassermann reaction of between ninety-three per cent. and ninety-four per cent.; while another skeptical observer (4) as late as May, 1921, rebukes scathingly the adherents of the high value of the Wassermann reaction; a third (5) gives a conformity between three serologists of about fifty-three per cent. These deviations of themselves do not mean anything beyond the apparent different degrees of technical efficiency and accuracy in different laboratories. We hear much about standardizing the Wassermann technic. There is no doubt that with advancement in knowledge and skill this valuable procedure is standardizing itself. It is not possible to place one hundred per cent. reliance on any one observation; there must always be a reasonable allowance for the unknown factor. Alignment of the clinical history and physical signs with the laboratory findings is what affords us the largest percentage of satisfactory diagnostic results. It would not be amiss besides favoring standardizing the Wassermann reaction to enter a plea for standardizing our intelligences in deciding the diagnosis of doubtful case of syphilis.

TREATMENT.

The second phase to be considered in the subdivision of the subject under discussion is treatment: the effect of prompt treatment upon the very important question of prognosis.

The diagnosis having been established beyond question, the most forceful measures of treatment that are known, in the light of modern advancement, most effectually to reach the invading parasites of the disease and cause their complete elimination, are adopted. This elimination is accomplished by direct action upon the living organisms, and by producing conditions in the system under which these parasites cannot live.

The therapeutic agents that are known today to fulfill most completely these requirements are certain preparations of mercurial and arsenical composition. The modern arsenical compounds, formerly known as salvarsan and now comprised under the American appellation arsphenamine, are believed to possess a property of direct action upon the Spirochæte pallida, in contradistinction from mercury, the action of which is thought to be indirect, by establishing unfertile conditions in the system. There is a possibility, however, that both of these agents possess similar properties, but to a different degree, and while much is made of the direct action of one or the other of these chemicals —the chemotropic effect—it is not to be discountenanced that the indirect or organotropic effect is equally important. In brief, the method of treatment to be adopted is more or less the same, whether it be in the primary undeveloped stage, the secondary active period, or the later or dormant stage, the difference being largely in the intensity and persistency with which the disease is attacked. Arsphenamine being administered intravenously and mercury hypodermically, the selection of the preparation may be largely one of individual choice within certain limits.

Modern substitutes for the original salvarsan, old and new, are of foreign and domestic manufacture, and have been universally adopted. They are marketed as acceptable substitutes, both because of chemical standardization and on account of favorable results obtained under their administration. The essential properties of low toxicity and high therapeutic potency have for the most part been attained.

For reasons of technic, the neosalvarsan or novosalvarsan preparation is employed principally. We find advocates of daily administration for three doses, of three injections on alternate days, and of four or five doses, given weekly. Each of these methods affords a high percentage of success. In the primary stage any of them may be employed. The last is the standardized method mostly in vogue, and the one preferred by the writer.

Of greater importance than the periodical dose of the arsphenamine course is the followup treatment with mercurial medication. This may be salicylate of mercury at weekly intervals, one and a half to two and a half grains at each treatment, or bichloride of mercury injections every second or third day, until fifteen to twenty of such doses have been administered, according to the constitutional effect. A subsequent course of salvarsan is always desirable. About six weeks after the last arsphenamine injection, a Wassermann test is made, and following this, whether the result be favorable or unfavorable, a supplementary arsphenamine course is administered, again followed by a mercurial series. This method of treatment, in effect, applies, as stated, to all stages of the disease. In general terms, the earlier the start the nearer the goal and the later the period the greater the necessity both for longer observation and repetition of treatments. The extremes of treatment should be discountenanced. One is the original Utopian claim of *therapia sterilizans magna* which aimed at the complete eviction of all invading parasites at a single fell blow. The other extreme is illustrated by excessive persistency of therapeutic activity as chronicled by one group of observers (6) who, to demonstrate the limitation of the Wassermann test, treated a series of about 150 cases with the administration of arsphenamine and mercury every alternate six weeks for two years, and in the third year with two arsphenamine treatments. Under this superintensive method is reported a strikingly disappointing Wassermann relapse: in the early cases, a comparison between the three months' period and that of two years showed an increase in the positive reaction of nearly fifty per cent. In the late active cases there was a gradual increase in the positive Wassermann, until at the end of three years it was over fifty per cent. We hear it stated, on the one hand, that syphilis is never cured, a degree of pessimism that is fortunately controverted by both clinical and laboratory records. The opposite extreme, that one hundred per cent. of the cases of this malady may, if taken in time, be entirely cured, while not so far in excess of the truth, is still not yet substantiated.

We recognize certain facts from present day observation: first, that as compared with a half century ago, up to the beginning of the era of arsphenamine therapy, the disease, while less virulent in its surface manifestations upon the skin and mucous membrane, became more prevalent in the deep seated late recurrences affecting the arterial and cerebrospinal systems. Furthermore, that in line with the advance of laboratory technic and the great reliability of blood examinations, it was revealed that many cases of the disease thought to be cured were but temporarily inactive; that under the older form of treatment not over twenty-five per cent. of patients remained well or out of danger of late recurrences. Next, it may be reasonably stated that since the introduction of the modern measures of treatment—arsphenamine therapy combined with mercury—adequately conducted in the active stages of the disease, there is a fair probability that the previously unfavorable statistics were transposed, and that the victim of the disease gained at least a three to one chance of being freed completely of its contamination, and of being spared the menace of such late recurrences as threaten the vital organs, cripple the body and destroy the intellect itself. While under the earliest possible treatment, namely, as soon as diagnosis can be established in the primary stage, it is probable the danger of this great menace of the future, neurosyphilis, is minimized. In Johns Hopkins it is reported that in less than one per cent. of the patients symptomatic neurosyphilis develops; although a very substantial percentage, as already set forth, reveal a positive spinal fluid reaction in the secondary stage.

Assuming the truth of these statements, what is the conclusion? It has often been stated that the reason for the occurrence of nervous syphilis may be found in the strenuous conditions of modern business and social life, in the neglect of treatment, and in various excesses. Yet, we all can recall examples, not one, but many individuals, who outraged every emphasized injunction and ran the pace that kills, who are, perhaps, derived from enervated stock, yet, who seem to get away with it without paying what would be called the price in the development of the degenerative form of the disease; while there are other individuals who have consistently followed the treatment laid down, who are phlegmatic, not neurotic, men or women, who have, in spite of apparently more favorable conditions, become incurable victims of both tabes and paresis. The existence of these contradictory cases is more noticeable under the ancient than the modern methods of treatment; yet, the paradoxical situation exists under both conditions. It may be that the explanation is biological, rather than neurological; that there exist certain strains of spirochete growth neurotropic in type, bred and inbred through generations of human media, that have developed special predilections for certain tissues. Be this as it may, the fact remains that the earlier the diagnosis, and the sooner that treatment is inaugurated, the better prognosis in the vast majority of cases. Therefore, we divide the prognosis into the various stages at which we recognize the existence of the disease. In the primary stage, when treatment is instituted promptly, prognosis is favorable in the highest possible percentage. In the secondary stage, when treatment is equally prompt and aggressive, the percentage of cures is, relatively, equally high. In the dormant and later cases, prognosis depends upon the persistence of treatment, the tenacity of the spirochete infection and the form that it has taken, namely, the extent of its development; which means the character it assumes, and, therefore, the predilection that it reveals for the deeper structures of the different organs of the body, in form of gumma, sclerosis, and other conditions. By routine examinations of spinal fluid in connection with treatment and serological examinations better observation and control of our cases are instituted. This method intelligently exercised in conjunction with the proper measure of treatment affords the greatest insurance against the danger of later neurosyphilis. It is remarkable what favorable changes are wrought by the modern form of treatment, persistently used. This applies to the respiratory, cardiac and digestive systems. When the disease attacks the cerebrospinal system, the outlook is far less favorable, and favorable in inverse ratio to the duration of such infection; but even here, before degenerative processes have set in, it is possible to accomplish what, under the old methods of treatment, was considered to be an impossibility.

In conclusion, when we review the great progress beyond the past in the knowledge and attainment of the present; when we weigh the possibilities of further progress, it is difficult to doubt that the future is radiant with hope for the achievement of the practical control of syphilis.

REFERENCES.

1. Moore: *Journal A. M. A.*, March, 1920.
2. Ormsby: *Ibid*, July, 1920.
3. Solomon: *Ibid*, March, 1921.
4. Van Niessen: *Urologic and Cutaneous Review*, May, 1921.
5. Wolbarst: New York Medical Journal, Jan., 1920.
6. Rohdenberg, Garbat, Spiegel, and Manheims: *Journal A. M. A.*, January, 1921.

On the Two Fundamental Forms of Syphilis*

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Under the overwhelming influence of the important advances that have been made in recent years in our knowledge of syphilis, both as regards pathology and treatment, some fundamental truths acquired in the experience of a bygone generation have been, as it were, submerged. French physicians, notably Fournier, many years ago drew a sharp distinction between what was recognized as ordinary syphilis with its surface lesions of skin and mucous membranes or its gummatous exudations in the deeper structures, and another form of syphilis which Fournier called parasyphilis. The term parasyphilis was especially applied to tabes and paresis. Of late years writers upon syphilis have ignored this distinction as though all syphilis both as regards pathology and treatment were the same. It has been forgotten, for instance, that all syphilis of the cord is not tabes and that all syphilis of the brain is not paresis. Surely it should not seem necessary to point out that in their symptomatology these two forms differ widely from each other. In gummatous syphilis of the brain, for instance, the predominant symptoms are headache more or less continuous and severe, somnolence, optic neuritis, gross and pronounced palsies of cranial nerves, together it may be with hemiplegia, unilateral or crossed, while mental symptoms are notably absent. Here the lesions consist of coarse gummatous deposits and infiltrations in the walls of the vessels and in the membranes, without any invasion of the brain substance, the parenchyma, by the spirochete. In gummatous syphilis of the cord again the symptoms are those of a paraplegia spastic in type though in a given number of cases ataxic symptoms are added; there are also slight sensory losses and characteristic bladder disturbances; first an early impairment of the power of expulsion and later of retention. The symptoms, too, as is notably the case in visceral syphilis, are asymmetrical, both the motor symptoms and the hypesthesia being more marked on one side than on the other. The spasticity also presents the peculiarity of disappearing or becoming greatly diminished when the patient sits down. Notably is there an absence of tabetic or lightninglike pains.

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How great a contrast both of these clinical pictures present with those of paresis and tabes! In paresis there is, especially, the slowly oncoming and gradually increasing dementia. There is tremor of the hands, lips and tongue, facial twitching, ataxtic speech, unequal, irregular, sluggish or Argyll Robertson pupils, slightly ataxic or spastic gait, slight or fugacious pareses of the cranial nerves; perhaps a history of transient hemiplegias or possibly of epileptiform attacks. Surely this is a very different picture from that seen in gummatous syphilis of the brain. Gummatous syphilis of the brain, I should add, is, because of the usual absence of mental symptoms, rarely met with in the asylums.

The contrast between gummatous syphilis of the cord and tabes is equally great, as a momentary reflection upon the triad of symptoms, the ataxic gait, the loss of knee jerks and the Argyll Robertson pupil, clearly indicates.

The clinical histories of the two forms of syphilis also differ widely from each other. Of the truth of this a large clinical experience, embracing the service of many hospitals and extending over many years, convinces me. The facts were long ago noted by the French, and with myself they have become truisms. It is a rare thing, for instance, in a case of paresis or tabes to elicit a clear history of an initial lesion. In regard to paresis it might be maintained that the mental condition of the patient is such that the early history is unreliable, but this cannot be asserted for tabes, in which the mental condition is in the large majority of cases unimpaired. At most, I have occasionally elicited in a tabetic a history of a lesion that was doubtful in character; often one that was considered as a mere abrasion and quite commonly as of little consequence. Quite commonly, too, it is impossible to elicit in a tabetic and still less in a paretic a history of secondary syphilis. Rarely can any account be obtained of any lesions of the skin or mucous membranes, falling out of hair, sore throat, etc. In the few instances in which such a history can be elicited, the account is always of secondary manifestation, slight, inconsequential, and attracting little attention. Not infrequently the patient was spoken of as having had an attack of socalled mild syphilis. In keeping with these facts there is a notable absence of scars upon the genitals or of the obvious results of gummatous lesions elsewhere; for instance, I have never seen a tabetic or paretic with a deformed, an indented or sunken nose, the result of syphilitic lesions of the nasal septum, nasal bones or cartilages.

These facts suggest a possible difference in the character of the infection in the two forms, the gummatous and the parenchymatous, as I believe they should be called. In keeping with this view, we find a number of confirmatory facts most significant in their nature. Every now and then, for instance, we meet with instances of socalled conjugal paresis or conjugal tabes. Both husband and wife in such cases suffer from paresis or from tabes. While I have seen a number of such instances, I have never met an instance in which one marital partner suffered from paresis or tabes and the other from gummatous syphilis. Gummatous syphilis—syphilis of the exudative form—I have met with in husband and wife many times and less frequently I have seen parasyphilis, the parenchymatous form, in husband and wife but never, may I repeat, the two different forms. It has always been the same form in both. Certainly an experience such as this now extending over many years can have but one meaning. Of the same significance are the cases in which a number of men were infected from the same source and all suffered from the same form of syphilis. For example, there is the well known instance reported by Morel-Lavallée and Béllières in which five men were infected by the same woman; all acquired paresis, and to this number Ramadier added a sixth. Another instance is that recorded by Brosius in which seven glass blowers were all infected by the same mouth piece; five were attacked by paresis or tabes while the remaining two presented suspicious symptoms. Is it not remarkable that here again we find syphilis of one form only instead of finding in some of the patients gummatous syphilis and in the others parasyphilis? Similar experiences have been placed on record by Nonne, Marie, Bernhard, Erb and others while I myself have added conjugal cases to the list.

Recently Levaditi and Marie (1) in a study of the treponema of general paralysis have restated the fact—a fact long previously known to the earlier clinicians—that syphilis begins and evolves in the future paralytics and tabetics in a manner rather benign and that the primary lesion is fugacious, that the secondary symptoms are ephemeral or nonexistent and that tertiary cutaneous and visceral lesions are exceedingly rare.

The experiments conducted by Levaditi and Marie upon monkeys and rabbits are most remarkable and demonstrate in a most convincing manner—indeed, prove beyond all question—that in syphilis there are two viruses, two different strains of spirochetes, which result in two different diseases, one the gummatous form of syphilis and another which gives rise to parasyphilis. The first they term the dermatropic form, the second the neurotropic form. I myself believe that the expressions gummatous syphilis and parenchymatous nervous syphilis would clinically be more useful.

Levaditi and Marie have shown that these two forms differ greatly as regards the initial lesion both in the period of inoculation and the appearance of the lesion. Their experiments showed that in the neurotropic (the parasyphilitic) form the average period of inoculation was very long, i. e. 127 days or more than four months though this period was shortened in consecutive effectual transmissions. In the dermatropic (the gummatous or exudative) form, on the other hand, the period of inoculation was about six weeks.

Again in the neurotropic form the initial lesions were superficial, comparatively slight; in the dermatropic form the lesions were far more pronounced and presented an indurated and cartilaginous base. In the neurotropic form the microscopical examination revealed a thickening and infiltration of the papillæ and the most superficial of the layers of the derma together with superficial ulceration; in the dermatropic, the gummatous form, on the other hand, the microscopical examination revealed a marked endarteritis and infiltration, intense invasion of the deep tissues and new connective tissue formation especially marked in the portions presenting cartilaginous induration.

Further, Levaditi and Marie found that in the neurotropic form the treponema is especially found in the epithelial layer, while in the dermatropic (the gummatous) form the treponema is especially found in the true dermal layer and about the vessels. The appearances are the same as those found in the human Hunterian chancre. A marked difference in the virulence of transmission was also noted; the latter was much less in the neurotropic than in the dermatropic form. In fact, the spirochete of the neurotropic form soon loses its virulence, while in the dermatropic form this virulence is preserved. How suggestive these results are when compared with the facts of clinical experience especially as to the feebleness of contagion of the neurotropic form!

Finally, the experiments of Levaditi and Marie as to crossed immunity are absolutely conclusive and establish definitely the distinction between the two forms of syphilis. They show that in syphilis we have *two different diseases* to deal with. Inoculation with one form of treponema does not prevent successful inoculation with the other; animals inoculated with one form acquire a refractory state in regard to this form but not to the other. Perhaps this explains the puzzling statement occasionally made by patients that they have had the initial lesion twice. Formerly, I used to explain these statements to myself by supposing that one lesion was either spurious or a chancroid and that only one was a true syphilitic lesion. The discoveries of Levaditi and Marie make entirely possible the occurrence of two separate and distinct syphilitic infections in the human subject.

Personally I am convinced that further advance both in our knowledge of syphilis and in our treatment of these two diseases is to be made by biological studies and researches. The facts already in our possession are most interesting and also most suggestive as to the possibilities of combatting the disease and as to new and radical departures in treatment. Chemotherapy in syphilis has already reached its limitations. Especially is this true in the case of parasyphilis. Tabes and paresis, especially the latter, are still largely beyond our control. All save those blinded to the facts or carried away by an enthusiasm uncontrolled by a dispassionate consideration of the facts, will frankly admit the truth of this statement.

The biology of the spirochete is briefly as follows. The spirochete is a protozoan; it is not a bacterium. It belongs to the proflagellata. Many species have been described. Spirochetes are widely distributed; they are found especially in decomposing and foul waters, in the ditch water of swamps and moors, in latrines, in ulcerating wounds and sores, in the blood and in almost all the tissues in certain diseases of man and other animals. They have also been found in fresh and salt water, and in the intestines and on the mucous membranes of healthy animals.

It is, to say the least, very significant that many of the nonparasitic forms are found living as saprozoic organisms in liquids which are rich in organic substances; e. g., foul waters containing decomposing vegetable and other organic materials. As just stated, some are found living on the mucous membranes of healthy animals. Have we not a hint here as to the possible origin or development and adaption of the form so destructive to the human organism?

Doflein (2) groups the spirocheta as follows:

Dwellers in body cavities (mostly harmless boarders).
Dwellers on the surface of normal mucous membranes.
Dwellers in ulcerating sores and inflamed mucous membranes.
Tissue parasites.
Blood parasites.

Two questions here suggest themselves: first, how did the Treponema pallidum acquire a habitat in man? secondly, why is it that man is the only animal that is vulnerable to it? Outside of the laboratory syphilis occurs spontaneously only in man. What are the reasons? With the exception of monkeys and rabbits in whom the inoculation is only accomplished with difficulty and under limited conditions, inoculation has only been successful, doubtfully and in a few instances, in dogs, sheep, goats, cats and pigs; never in cattle and never in the horse. The horse suffers from a spirochetic disease of his own dourine, but not from human syphilis.

Does it not seem that other animals enjoy an immunity from the Treponema pallidum, an immunity not granted to man, because of the presence of some substance—a normal antitoxin—in the blood not present in man? Is not the final conquest of syphilis after all to be serological?

Further, some of the other facts in our possession are also most suggestive. First the Treponema pallidum has no power of reducing proteins; it is absolutely without proteolytic action. In other words, in order that it may live other organisms must always be present. The difficulty and repeated failures in endeavoring to maintain pure cultures are conclusive proof of this. Again, the treponema is anaerobic and it appears therefore that for its oxygen metabolism it is dependent on other organisms. Marie and Levaditi, it is true, were able to grow cultures of the treponema in collodion containers but they were obliged to immerse these containers in a culture of an aerobic bacillus. It would appear that the treponema is an organism of feeble vitality, easily destroyed. Do not these facts justify the hope of new methods of attack?

REFERENCES.

1. Levaditi et Marie: Etude sur le Tréponème de la Paralysie Générale. *Annales de l'Institut Pasteur,* November, 1919, xxxiii, No. 11, p. 441.

2. Doflein: *Lehrbuch de Protozoenkunder,* Dritte Aufl. 1911, p. 352.

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Observations on the Diagnosis of Neurosyphilis*

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It is my intention in this paper to confine myself mostly to the diagnosis of syphilis, and in particular to the problem presented by syphilitic involvement of the neuraxis.

The concurrence of visceral syphilis with neurosyphilis is appreciated by those of us who see many cases of the latter, but do we realize the frequency with which this occurs? The incidence as estimated in secondary syphilis is about twenty to thirty per cent. and in tertiary syphilis from thirty-five up to fifty per cent. I believe these early cases of neurosyphilis occurring as an accompaniment of secondary or early tertiary lues are the tabetics or paretics of a decade later. But how are we to diagnose the cases of central nerve involvement, many of which, especially in the early and curative stage, show no sign suggestive of nerve tissue destruction? Spinal puncture is the one diagnostic procedure of greatest value in these cases.

The serological examination of the spinal fluid reveals things which are of importance in the diagnosis of neurosyphilis. An increased globulin, while not diagnostic, indicates inflammation within the subarachnoid space; a positive Wassermann reaction indicates the presence of syphilis, and is, of course, absolutely diagnostic, but the strength of the Wassermann test does not parallel the virulence of the neural infection, some cases of active neurosyphilis having a one plus or a negative reaction. However, I am told by the laboratory workers that cases of general paresis usually have a very strong reaction, best exemplified by a five plus reaction.

In the cell count and colloidal gold curves we not only have aids to diagnosis of neurosyphilis, but also help in differentiating the numerous types of this disease. As a general rule it can be intimated that the number of cells is a rough estimate of the amount of meningeal involvement. From this we can predicate that those with low cell counts are apt to show a maximum amount of parenchymatous nervous tissue destruction, such as the long standing cases of tabes with little pain but much ataxia, the spastic paraplegias, and also paresis, while those with cell counts above fifty or seventy-five are the meningeal types, such as basilar meningitis, gummata, tabes with pain, etc. It is also these latter types in which treatment is of maximum benefit.

The colloidal gold reaction is obtained in a number of other inflammatory diseases of the central nervous system, and for this reason is not, as was thought when it was first introduced, diagnostic of tabes, paresis, or cerebrospinal lues. A curve which rises higher than two is definitely pathological and indicates the presence of some inflammatory products in the fluid of a lipoid or protein nature. Curves of the stepladder or socalled paretic types with complete decoloration in the first few tubes are found in poliomyelitis, epidemic encephalitis, and disseminated sclerosis. In neurosyphilis a paretic curve is always suggestive, but not always diagnostic, it being found in some vascular types which have neither the physical signs nor the course of paresis, and yield readily to treatment. Decoloration of the tubes in the midzone of the curve, the socalled tabetic or luetic curve, is even less diagnostic of tabes, for any type of neurosyphilis is apt to give this, and any infectious or toxic condition involving the central nervous system is likely to produce a rise in the curve of the midzone. It is interesting to note that by the addition of varying quantities of blood to normal spinal fluid it has been possible to reproduce almost every type of colloidal gold curve. One can see, then, that like many of the laboratory examinations the colloidal gold curve cannot be relied upon for a diagnosis, but a pathological curve combined with the other serological tests and clinical examination is at times invaluable.

Briefly, I should like to mention two unusual types of neurosyphilis which occur with sufficient frequency to warrant mention, namely, those in which the clinical examination is entirely negative, with a positive serology, and those in which there are clinical signs of luetic central nervous involvement, with negative serology. The latter demand treatment as well as the former, but the cure can be gauged only by the clinical condition. The occurrence of neurosyphilis in an active or latent form is common in congenital lues, and it is my opinion that every case of the hereditary form of the disease should have a spinal puncture.

The percentage occurrence of neurosyphilis is so high that I also feel that before discharging a case of syphilis as cured a spinal fluid examination should be made. This is also imperative in those Wassermann fast patients whom we occasionally see.

Of much importance in the diagnosis of neurosyphilis is the examination of the central nervous system. The syphilitic eye is, barring epidemic encephalitis, practically pathognomonic of the disease, and its characteristics are, as you know, irregular pupils which are unequal and do not react to light, but do react to accommodation—the Argyll Robertson pupil. A paralysis or loss of function of any of the cranial nerves is a common occurrence. Alteration in the reflexes, and the presence of typical or shooting, indefinite rheumatic or neuritic pains in the legs may be present. Bladder symptoms are often one of the early signs of spinal cord involvement. The occurrence of mental episodes and convulsions in paresis, of vascular crises, such as apoplexy, or spasm in vascular neurosyphilis, and a host of other signs and symptoms which it is not within the scope of this short discussion to enumerate, all point to a luetic neuraxial disease.

In closing, I should like to emphasize again the frequency of neurosyphilis and the value of spinal puncture as an aid, not only for diagnosis, but to guide one's treatment.

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*Read before a meeting of the Bellevue Alumni Association.

Diagnosis of Late Hereditary Syphilis and Lupus in Otorhinolaryngology

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Syphilis and tuberculosis both present a variety of clinical manifestations, but if some of them have sufficiently obvious characteristics for positive diagnosis, others may not be so easily classified, such, for instance, as hereditary syphilis and chronic tuberculosis of a lupous character. In some cases we have to deal with lupus, which may be found at any age, but most frequently in adult females. The injured organs are, in order of frequency, the nose (nostril vestibule and cartilaginous septum), the larynx (chiefly the epiglottis and the arytenoepiglottic folds), the pharynx (more frequently on the pillars than on the soft palate), and the external and internal sides of the cheek. In other cases we are in the presence of late heredosyphilitic manifestations. These occur in childhood and adolescence, between the ages of eight and twenty-five, and are particularly to be met with on the soft palate, in the nose, the arch of the palate and the back partition of the pharynx.

COINCIDENCE.

Syphilis and lupus may also coexist in the same person, and appear in the form of syphilitic manifestations in the pharynx and nose, and lupus in the larynx and epiglottis. Finally there are cases in which one may well suppose that syphilis and tuberculosis combine on the same part of the body, thus forming a mixed manifestation, a luposyphilitic hybrid, the anatomical seat of which would be in the nose, pharynx, soft palate and on the root of the tongue and epiglottis.

The diagnosis is often extremely difficult; it is even impossible without the help of the laboratory. We shall now review the various elements which may help to form an opinion, and that Arlet, our pupil, has very aptly set forth in his thesis (Bordeaux, 1921).

CLINICAL DIAGNOSIS.

During the period of induration, the gumma and lupus have quite different symptoms.

The gumma, whatever its seat may be, can be diffuse or limited. In the latter case it presents itself as a reddish tumor, smooth, even, localized, of a hard consistency at first, then renitent and even soft.

In cases of lupus a distinct discoloration of the mucous membranes, and chiefly of the soft palate, is first noticed. The injured tissue is strewn with small reddish granulations which appear on an infiltrated, rosy and softened mucous membrane, gradually mingling with the healthy parts.

During this first period the general symptoms of syphilis and lupus are insignificant and the functional symptoms are identical; the pain is practically nonexistent. According to the place of the lesion, a sense of fullness in the nose, nasal quality of speech, difficulty in deglutition or breathing, if the tumor is in the larynx, may be observed.

This period of induration does not last long in cases of syphilis; the gumma softens rapidly and becomes pitted with small craters, which gradually unite and form a more or less extensive excavation with anfractuous, red, projecting, abrupt edges and a greyish squalid bottom, resembling the core of a boil—thus causing an ulceration of the serpiginous kind, which quickly extends to the surrounding parts of the membrane and, owing to its rapidly destructive process, involves loss of substance often considerable and irreparable.

Lupus has also a period of softening and ulceration, but the process is slower and the ulcerations it causes are often smaller, less destructive than those of syphilis, with more irregular edges, of a violet color, thinner and without clear demarcation with the healthy parts, on which may be seen the small yellow granulations peculiar to tuberculosis (yellow spots of Trélat).

The bottom of the ulceration, which is not so deep as in syphilis, is covered with a small quantity of a greyish secretion and sometimes with small scabs of a barley sugar color and soft consistency.

During this second period functional symptoms are more important and attract the attention of the patient to a greater extent. In cases of lupus, the pain which is so little at first, becomes stronger in the various movements of deglutition. The patient blows a few small yellow scabs out of his nose, is hoarse and expectorates a small quantity of grey substance. Adenopathy always exists. In syphilis the melting of the gumma and its discharge are manifested by the blowing out or expectoration of sanious matter tinged with blood.

The respiratory disorders are in both cases often insignificant, but may be given a considerable intensity by the edema of the larynx. In syphilis the sensitiveness of the back part of the throat is blunted, whereas with tuberculous people all laryngoscopic examination becomes difficult and causes violent fits of a distinctive sort of coughing.

COURSE OF DISEASE.

Finally, as regards its progress and evolution, syphilis may otherwise be distinguished from lupus, inasmuch as syphilis develops more rapidly, and causes much more important destructions, which have very little tendency to heal if they are not attended to. Lupus develops into nodular, pale, and retractile scars, while the injuries caused by syphilis remain as a stigma of the preexisting lesion, and its ulcerations are transformed into starshaped scars, sunken, of a fibrous aspect, with a yellow bottom, the pale color of which contrasts with the rest of the mucous membrane.

CLINICAL MANIFESTATIONS.

The clinical symptoms we have just reviewed are sufficiently marked in most cases to justify a diagnosis of syphilis or lupus, chiefly during the induration period; but the confusion becomes possible in the case, 1, of ulcerations consecutive to the gumma, which assume a torpid aspect when they are not dealt with; 2, of lesions in a person in whom syphilis and tuberculosis coexist; 3, of hybrid luposyphilitic manifestations.

What is, then, the aspect of these lesions? The mucous membrane generally loses its color and much of its sensitiveness. The ulceration may hold a large area and extend over several anatomical regions at the same time (soft palate, pillars and larynx for instance), being superficial in places, deeper in others, with a greyish bottom sometimes, but having in most cases a great quantity of granulations. Its edges are well marked in some parts, not very clear elsewhere, jagged and giving a sensation of softness when touched or sometimes feeling like a hard infiltration, similar to cardboard.

The sensitiveness is frequently lessened; these lesions are painless and are very irregularly attended with adenopathy. They develop slowly, insidiously, without the knowledge of the patient himself, and are often discovered only after a minute examination, and many times in the course of another disease. This, we must add, unless they have already caused a destruction of the soft palate, which is characterized by the nasal quality of speech and the flowing back of liquids through the nose, or unless the epiglottis should have been entirely eaten away and could no longer fulfil its function. In the latter case the deglutition of food (mostly liquid) is attended with fits of coughing caused by its introduction into the windpipe. This symptom, however, is very rarely observed, for after an epiglottectomy (amputation of the epiglottis) or the total disappearance of the epiglottis consecutive to an ulceration, the root of the tongue does the duty of the epiglottis in stopping the windpipe during deglutition.

All these clinical symptoms of hybridity can give only an induction of probability. After having, therefore, thoroughly examined the lesions, one must take into account all the information that may be provided concerning the patient, the very ground, that is, in which the lesions have developed.

The certainty that one has to deal with an heredosyphilitic person, acquired from information given by the progenitors concerning themselves or their collateral relations, may justify the hypothesis of a syphilitic lesion. But one often finds a scrofulotuberculous diathesis, in which the tuberculous antecedents are not rare, being sometimes limited to small lesions in the father and mother, and also hereditary antecedents in the family—brother or sister having ganglionic tuberculosis or having died from meningitis.

Among hereditary antecedents one must also take into account alcoholism as favorable to scrofulous manifestations. Personal antecedents are also of importance, according to the age of the patient, in tracing an acquired syphilis or detecting scars left by small ganglionic or osseous tuberculous lesions, although sometimes syphilis, and in particular hereditary syphilis, simulates so well osseous or ganglionic tuberculosis that one can be mistaken.

Finally, Hutchinson's triad must be looked for: ocular, dental and auricular manifestations. But these being rarely met together, a fourth symptom should be taken into account, which is more frequent and may now be ascribed to hereditary syphilis, namely, hydarthrosis. It will not be, therefore, a triad, but a tetrad which will guide us.

All this shows that the means which the clinician possesses are excellent, but insufficient for a precise diagnosis. It is absolutely necessary, therefore, to make systematic inquiries as to the possibility of an exact diagnosis based on the reports of the laboratory.

LABORATORY DIAGNOSIS.

The laboratory has various means of detecting tuberculosis or syphilis and relies on tests bearing on local manifestations or tests of a general kind.

Laboratory tests for the diagnosis of tuberculosis.—1. Related with local manifestations: a, histopathological examinations; b, discovery of the causal agent; c, inoculation of animals.

2. Of a general kind: a, serodiagnosis; b, reaction to tuberculin.

Histopathological examination.—We admit that the microscope cannot in every case give unequivocal answers and sometimes it is extremely difficult to obtain a precise result. But generally it is not the microscopic examination which is incomplete, but the sample which is bad, on account of an imperfect process of biopsy. This leads us to say a few words about this process.

It may easily be understood that the anatomopathologist can describe only the structure of the fragment which is given to him, and nothing else. He must receive, therefore, a fragment suited for the examination. The laboratory receives too often the scrapings of a mucous membrane, removed no matter where or how. To have an accurate microscopic diagnosis it is absolutely necessary to be able to place the fragment in a convenient position so as to make sections showing the various planes from the surface to the deeper parts, the relation of the tissues to one another, and the cellular arrangement, which is not possible with a scrap of membrane removed tangentially to its surface and more or less lacerated. It is necessary that the fragment should not be spoiled or crushed by the instrument with which it is removed, so that the structural elements may have in the section the same disposition they had on the patient.

Our aim is then: 1. To take the sample in the tumor itself; 2, to have an undamaged biopsy and one of sufficient importance to allow a thorough examination.

MICROSCOPIC FEATURES OF TUBERCULOSIS.

What are, now, the distinctive microscopic features of tuberculosis? Tuberculosis is a disease which finally consists in the formation of an infectious follicle. In the centre of the follicle, which is the elementary lesion, the microbe has fixed itself (bacillus of Koch, the origin of the infection) and is enclosed in an enormous element, the giant cell. This giant cell, irregular in shape, is composed of a mass of granular matter, which contains a varying number of nuclei of different forms. These nuclei are disposed near the surface of the cell, which, in a section of its middle part, seems to be encircled as it were by what seems to be a crown of nuclei.

Round this giant cell the elementary follicle is filled by a stratum of big polygonal cells, containing one and sometimes two big nuclei, i. e., the epitheloid cells. In the outer part is a second lymphoid zone composed of small lymphocytes or mononuclear cells. Those elementary follicles agglomerate in granulations rich in giant cells and quickly invaded by caseous degeneration (owing to the action of the toxic substances elaborated by the bacillus of Koch) which may not enable us to recognize at any point the trace of a previous typical nodular process. The bloodvessels and lymphatics share in the disorders which surround them, without having at first a predominant place in them, the presence of a vessel being in no way necessary to the growth of a tuberculous lesion.

Discovery of the bacillus of Koch.—This will be made either in the fluids exuded, those being spread and stained with Ziehl solution used hot, or in the tissues after having colored the sections with Ziehl used cold during thirty minutes. But the test is rarely positive in nodular tuberculous lupus and, consequently, throws but little light on this particular question.

Inoculation.—In a series of guineapigs inoculation followed by an autopsy to discover the bacillus of Koch is a process of great value. It is sufficient to take—in an aseptic way—some of the serosity on the ulceration by means of a syringe and to make a subcutaneous injection in the inguinal region.

One may also, after a biopsy (if the inoculation cannot be made immediately, the specimen is kept in physiological serum) introduce aseptically the fragment in the subcutaneous cellular tissue of the abdominal region, after having made a small incision with a bistoury. To find, after about six weeks, a tuberculous chancre on the point of inoculation, or to find that the animal dies of diffuse tuberculosis and to discover the bacillus of Koch in the regional ganglia or the viscera, are absolute signs of tuberculosis, but the converse is not true and a negative inoculation does not allow of the rejection of the hypothesis of tuberculosis.

SERODIAGNOSIS OF TUBERCULOSIS.

The method used by Arloing and P. Courmont in the serodiagnosis of tuberculosis is an excellent one based on a principle similar to Widal's reaction (serodiagnosis of typhoid), but in the case with which we are concerned, that is, with lupus, the process is too often negative to be of real value. The reaction of the antigen of Portmann enables one to trace tuberculosis in exudations and secretions. It may be used whenever, in the course of researches for the stigmata of heredosyphilis, one is in presence of hydarthrosis, for instance, to know if the fluid contained in the articular serous membrane is of a tuberculous nature.

Encouraged by the happy results obtained up to the present day with Besredka antigen in lesions going through evolutions and in the torpid forms of tuberculosis the diagnosis of which is uncertain, we shall do well not to neglect this reaction which will often enable us to trace the latent tuberculosis which may be present.

Tuberculin reaction.—Of the three methods (cutaneous, intradermic and ophthalmic reactions) ordinarily used for the differential diagnosis of tuberculosis and tertiary syphilis, one only may give some results. Augagneur has shown that, with the exception of the ophthalmic reaction, tuberculin tests applied to syphilitic people gave positive results tallying with those obtained with tuberculous persons. So that, as Bernay says, one may draw the conclusion, with Goelinger, Nicolas, Favre, Charlet and Augagneur, that syphilitic persons having no tuberculous lesion react as well to tuberculin as averred tuberculous subjects as regards the cutaneous and intradermic reactions. The ophthalmic reaction alone would show a slight difference.

LABORATORY TESTS USED IN THE DIAGNOSIS OF SYPHILIS.

I. Related with local manifestations: 1, Histopathological examination; 2, discovery of the causal agent; 3, inoculation of animals.

II. Of a general kind: 1, Serodiagnosis; 2, intradermic reaction to syphilis; 3, cytology of the cerebrospinal fluid; 4, blood cytology.

Histopathological examination.—Syphilitic lesions finally consist, like tuberculosis, in an elementary infectious follicle. The spirochætæ, which are the pathogenic agents, are phagocyted in a specific giant cell which differs in no way from a tuberculous giant cell: same central accumulation of caseous aspect, same abundance of elongated nuclei, various in shape, same crown arrangement and same protoplasmic edge. Round the central giant cell, the zone of epithelioid macrophagi may be the same as in the tuberculous follicle, also the outer leucocytary edge; and the same necrotic disaggregation of caseous nature may destroy the elementary follicle.

The disorders are often much less typical; the giant cells are frequently missing in the centre of the elementary syphilitic follicles, as well as on the periphery of the nodule, whether because they have not been able to form or have disappeared under the influence of caseous necrosis. The capillary vessels and the lymphatics included in the pathological region show the signs of a marked cellular irritation and their vent is often thrombosed.

Discovery of the treponema.—The infectious agent of syphilis (Spirochæta pallida or Treponema pallidum) may be looked for in spread fluids exuded from the ulcerated regions as follows:

1. Unstained, by ultramicroscopic examination; it appears in the form of a thin, refracting filament, very bright and mobile in the fluid.
2. Stained with Giemsa blue, it shows pale rose and often also blue.
3. Stained by the Fontana-Tribondeau method, it stands out black on a brown background.

The treponema may also be looked for in the tissues by staining a fragment in the mass with nitrate of silver according to the Levaditi-Manoudian process; it shows black on the brown tissues. The most successful method of inoculation in animals is that used with superior apes, by scarification. It may also be done in the anterior chamber of the eye of the rabbit, but it almost always fails in tertiary syphilis.

METHODS OF SERODIAGNOSIS IN SYPHILIS.

The methods of serodiagnosis are numerous: Bordet-Wassermann reaction; various biochemical methods which are only simplifications of the former; chemical reaction of Noguchi; of Schurman, based on a staining reaction; colloid benzoin reaction of the cerebrospinal fluid; formal jellification, which cannot yet be trusted, although the results are quite concordant with those of the Bordet-Wassermann reaction; and reaction of Sachs-Georgi, the easy and economical execution of which may be carried together with the Bordet-Wassermann process to throw light on some dubious cases, although it must be noticed that the concordance of results is less frequent for hereditary than for acquired syphilis.

Of all these methods only one deserves to be taken seriously, that is the Bordet-Wassermann process. Although its specificity has been questioned, the serodiagnosis is positive in seventy per cent. of averred cases of syphilis. We may then admit the practical value of the Bordet-Wassermann reaction in blood or the cerebrospinal fluid. In most cases a positive reaction enables to affirm syphilis, but a negative one does not allow of the rejection of the hypothesis of syphilis.

Intradermic reaction to syphilis.—This is a method described by Nicolas, Favre, Gautier and Charlet. The cutaneous reaction has given no results; the intradermic reaction alone has shown results parallel to the Bordet-Wassermann process, but the value of this method has not yet been ascertained.

Cytology of the cerebrospinal fluid (Studies of Widal, Sicard and Ravault).—Some information may be obtained by this method in secondary syphilis; but the results are still doubtful in tertiary syphilis.

Cytology of the blood.—Blood lymphocytosis, according to the researches and conclusions of Mazza, cannot be considered as a sign helping to the diagnosis of syphilis any more than to the diagnosis of latent tuberculosis.

In short, laboratory tests are very numerous; but a few of them only enable one to make a positive diagnosis of syphilis or tuberculosis.

NEW METHODS.

We know what importance can now be lent to the giant cell for the differential diagnosis of tuberculosis and syphilis. The giant cell, as the pathological entity of tuberculosis, has had its day. The works of Nicolas and Favre and of Georges Dubreuil are convincing enough on the subject.

P. I. Elizalde gave an interesting report in September, 1920, to the Society of Biology of Buenos Aires, enumerating the distinctive features of the granulation tissues of tuberculosis and syphilis in necrotic lesions.

He says: "The action of the tuberculous bacillus and that of the treponema, are essentially different. The tuberculous germ creates necrosis by the bacillary substance which attacks the cells holding it, then diffuses round and injures the neighboring cellular elements. The necrosis of syphilitic caseification has always its cause in a vascular obliteration. Syphilitic giant cells, on the other hand, are not a centre of attraction for the other cellular elements, as is the case for the tuberculous giant cells. In a word, the difference between syphilitic and tuberculous lesions is not shown by a separate cellular element, but by the examination of the characteristics of all the cells."

The distinctive features noted by P. I. Elizalde may sometimes be met with in typical cases of syphilis and tuberculosis, but we have not found them in the lesions that we have examined. The inoculation of apes and in the anterior chamber of the eye of rabbits are costly processes, which give doubtful results, chiefly in tertiary manifestations. The discovery of the treponema is quite uncertain and the reaction of Bordet-Wassermann sometimes deceitful, but these two processes alone, when the reaction of Bordet-Wassermann is positive and when the treponema is seen either in the tissues or in the exudates, it is possible to make an unequivocal diagnosis.

Of all the methods of discovery of tuberculosis, the various reactions to tuberculin have no interest for us, since they are as often positive in cases of syphilis as in cases of tuberculosis. The bacillus of Koch is not at all easy to detect, and is very rarely found in lupus; but it is enough that it should be discovered to be certain of the tuberculous nature of the disease. Similarly the positive inoculation of guineapigs still holds its absolute value, but a negative inoculation does not prove the absence of tuberculosis.

CONCLUSIONS.

The diagnosis of late hereditary syphilis and of lupous tuberculosis is often extremely difficult, even with the help of the laboratory. Still it is essential to gather all the information that can be given by the laboratory, so as to obtain as much certainty as possible and not call too hastily *scrofulate de vérole* a lesion which is only syphilis or tuberculosis.

Hybrid cases of syphilis and tuberculosis are most rare for out of 50,000 observations in the course of fifteen years (1900-1915) at the otorhiholaryngology department of the University of Bordeaux, only five cases are found to be diagnosticated *scrofulate de vérole*, without, besides, the assurance of the laboratory.

But in four cases personally followed since that time and which clinically seemed to be luposyphilitic hybrids, thorough laboratory researches have shown that one case was tuberculosis of a lupic form, and the other three were cases which proved to be late hereditary syphilis.

It is needless to insist on the importance of establishing an accurate diagnosis to avoid the disasters of inopportune therapeutics (noxious influence of a biodide treatment in some tuberculous lesions, for instance).

25 bis Cours de Verdun.

Transmissibility of Syphilis in the Latent Stage and Insufficient Treatment of Early Syphilis*

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Latency in syphilis may be regarded as a sort of balance between the defensive mechanism of the host and the virulence or aggressiveness of the spirochetes. This balance can be upset at any time as a result of whatever accident may throw the balance of power one way or the other. In this manner it happens that the organisms break loose, from time to time, from their hiding places and cause fresh invasions. This explains the occurrence of tertiary symptoms after many years of latency. It also explains why a patient with latent syphilis may infect others, in spite of the fact that he may have been symptomless for many years.

That latent syphilitic patients harbor spirochetes and are capable of infecting others has been sufficiently demonstrated. Savnick (1) found spirochetes in the mouth in five out of thirty-four cases of latent lues. Freuwald (2) found spirochetes in the lymph glands in ten per cent. of latent cases. Engman and Eberson (3) found the organisms in the lymph glands in three out of fourteen cases of latent lues and in two out of seventeen specimens of seminal fluid. Arzt and Kerl (4) found spirochetes in the scar of a chancre in a patient who had been clinically and serologically negative for a period of eight years. Sainz de Aja (5) reported a case where a chancre developed in a woman after she had been married a short while to a man who was clinically negative and who denied a history of syphilitic infection. In the case described below, the woman has probably infected her husband after a period of latency of seven years' duration.

Case.—Mrs. B. P., was twenty-one years old, born in Holland. She was married and had charge of a storeroom in a large hotel. She came under observation on March 18, 1914. She said that her husband had a chancre about four weeks previously. A baby was born to them about that time and it lived only about a month. Her present illness dated back to just prior to the birth of the child, when she developed a sore on the vulva.

On examination, the patient showed a maculopapular eruption on the trunk, a corona venerea, a syphilitic alopecia, a condyloma latum on the vulva, with general adenopathies and a syphilitic angina.

Up to March 30, 1914, she received two injections of one grain each of mercury salicylate and one injection of three tenths gm. of salvarsan. Her rash had completely disappeared, the pharyngitis was much improved, the cervical glands were no longer palpable, and the inguinal regional lymph nodes had markedly diminished in size. The condyloma was nearly healed. By June 13, 1914, she completed a course of five salvarsan injections, four of which consisted of only two tenths gm. each, and ten mercury salicylate injections. At that time the patient was completely free of symptoms. Even the alopecia was no more to be seen. After a rest period of four weeks a Wassermann test was made and proved negative.

That period was not far removed from the days when the efficacy of salvarsan was greatly overrated and accordingly a negative Wassermann reaction was regarded as fairly good evidence of a cure, regardless of how little treatment the patient had received. Therefore, treatment had not been resumed, but the patient was ordered to return after a month for another test. The reaction was again negative on July 17, 1914. On August 31st a third specimen of blood was taken for a test and, when the patient came back a week later to inquire about the results, not only was the reaction positive, but also a general adenitis had redeveloped and lenticular papules appeared on the neck and abdomen. She received one salvarsan and one mercury injection and disapeared from further observation.

She again appeared on September 14, 1921, after an absence of seven years, and told this immensely interesting story. She had lived with her husband for a short time after the last treatment. The husband remained untreated and, when she redeveloped a sore on the vulva, she believed that he had infected her a second time. Whereupon she left him and was subsequently removed to City Hospital where she remained until she was discharged five weeks later, when all symptoms had again disappeared. Her husband was then deported as a public charge and she had obtained a divorce.

She married again in 1916. Since then she gave birth to two apparently healthy children, had no miscarriages, and remained symptomless to date. Two weeks prior to her second appearance on the scene her second husband developed a sore on his penis. A diagnosis of chancre was made and his blood gave a four plus Wassermann reaction. He absolutely denied promiscuous intercourse.

On examination the woman was found entirely free from any signs of syphilitic disease. There were no visible vulvar, vaginal, or cervical lesions and her blood, as well as that of both her children, yielded a negative reaction. She was placed under treatment on general principles and, after she had received three injections each of arsphenamine and mercury, her blood again reverted to the positive, giving a plus four reaction.

It is unfortunate that a diligent search for spirochetes in the vaginal secretions had not been made. That would have established beyond doubt the fact of the woman's being a syphilis carrier. As it is, there can not be much doubt that the woman had infected her husband. For that we must take into consideration the husband's absolute denial of promiscuous intercourse and the fact that the wife had not received sufficient treatment to be cured of her infection which she contracted in 1914. It can not be argued that the second husband had contracted the disease elsewhere and had reinfected his wife. It clearly cannot be a case of reinfection, the main reason being that there was no cure and, according to modern belief, reinfection can only take place after the disease has been eradicated from the system. She had received only an extremely small amount of treatment before she became latent. She had no symptoms of a new infection. Small invisible lesions of a tertiary nature were probably present somewhere along the genital tract and caused the infection of the second husband. The negative reaction in the woman could not be taken as that occurring in the very early stages of syphilis, because in these cases the reaction is not likely to become positive after treatment.

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*Read before the Association of the Alumni of the Lebanon Hospital, February 14, 1921.

It is a well known fact that the chancre will disappear of its own accord without any treatment within a period of a few weeks. If the patient remains untreated, there follows a period, lasting from six to ten weeks, during which there are no symptoms and the patient is not inconvenienced in any way. This is sometimes called the second period of incubation. During this period the invasion of the tissues of the body by the spirochetes progresses steadily, and the microorganisms tend to localize in the viscera and especially in the skin, giving rise to the various visceral manifestations of secondary lues and to the secondary skin eruption. In these areas of localization numerous antibodies are probably formed. Kolmer (6) and others found agglutinins in fifty per cent. of syphilitic sera examined. Eberson (7) found spirocheticidal properties in the serum of patients whose blood gave a negative Wassermann reaction, in those who gave a weakly positive reaction with cholestrinized antigen only, and in infants when their mother's serum also possessed spirocheticidal properties.

The secondary lesions, as well as the primary, disappear without leaving any trace of their former existence. From that time on the patient may go on for many years without presenting any clinical evidence of the disease, yet his system harbors spirochetes and he is capable of infecting others, in the same manner as the typhoid carrier, who is free from clinical symptoms and, at the same time, is capable of disseminating the disease. This is called the period of latency in syphilis. While latency exists, the patient is known to possess the power of resisting infection from an outside source. At the same time, invasion from within is possible. According to Engman and Eberson (3), latency is only attained through a general systemic invasion of the tissues of the body of the host by the spirochetes. When the above process is interfered with, there is no immunity developed, because there are not enough antibodies formed in the system. When treatment is started early in the primary stage, the secondary eruption is eliminated and, if we assume that this systemic invasion is a necessary factor in the production of immunity, it appears reasonable to suppose that true latency never exists in treated individuals. If treatment is not massive enough or is not continued long enough to kill all or most of the spirochetes, recurrences are the result, because the remaining organisms are not hindered by any defensive mechanism on the part of the system. To illustrate this, the above authors cite the case of a physician who was accidentally infected with lues. He received two courses of combined mercury and arsphenamine treatment and his Wassermann reaction became negative. There were no secondary symptoms, as the treatment started before the latter appeared. He discontinued treatment and, after a lapse of one year, returned with a macular eruption. This admirably illustrates the fact that, in syphilis, the systemic invasion with its secondary manifestations may be indefinitely delayed by a subcurative course of treatment. As a matter of fact, we also know that patients who already had their secondaries developed when treatment was started may have a recurrence of the eruption, if the treatment has been insufficient. This recurrence is likely to take place during or after the rest period usually allotted to patients between courses of treatment. This is plainly shown by the case reported above and also by the one following.

CASE II.—E. R., male, twenty-eight years old, came for treatment with a healing chancre and a secondary roseola, which had existed for about a week. He received five injections of arsphenamine consisting of two decigrams each and ten weekly injections of mercury salicylate of one grain each. After a period of rest which lasted one month he returned with a fresh papular syphiloderm which covered almost the entire body. There were also adenopathies. Both disappeared after a few treatments.

From these cases we learn:

1. That a secondary eruption may recur in cases that have not received sufficient treatment.

2. That a fresh systemic invasion may take place not only in cases where the secondary eruption has been suppressed by a subcurative course of treatment, but also in cases where the subcurative treatment has been started after the appearance of the secondary eruption. In this case the second eruption is called a recurrent secondary.

Additional deductions can be made from the first case reported.

1. That a latent syphilitic may infect others. In this case after having been symptomless for seven years.

2. That a negative Wassermann reaction in an asymptomatic patient in the presence of a syphilitic history means nothing.

3. That a negative reaction in a syphilitic may and frequently does revert to the positive after a certain amount of treatment.

4. It tends to corroborate the law of Profeta, in so far that a syphilitic mother may give birth to asymptomatic children, but no conclusions can be drawn as to whether a syphilitic mother can give birth to nonsyphilitic children. It is unfortunate that the two children mentioned above have not been long enough under observation to determine the presence or absence of syphilis.

The references will appear in the author's reprints.

The Interpretation of the Wassermann Reaction

Its Reliability and Limitations

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The recognition of the frequent use of the Wassermann test is in no sense new, and much has been written on the matter by a number of able men. Nevertheless, the knowledge is by no means general and the important points will bear repetition many times, particularly the correct interpretation of the results of the Wassermann test. The literature on the subject, although quite abundant, is at times conflicting, and leaves many in doubt as to the merits of the test.

BASIS OF WASSERMANN TEST.

I shall not attempt to go into the details of the technic of the test save to mention the principle involved. The Wassermann test is based on a reaction known as the complement fixation reaction first described by Bordet and Gengou in 1906. It will be remembered that in order for bacteriolysis or hemolysis to occur antigen, amboceptor, and complement must be present. For purposes of illustration, if we add sheep cells (antigen), blood serum of a rabbit immunized to these cells (amboceptor), and fresh normal blood serum (complement) hemolysis will occur, i. e., the hemoglobin of the red cells is washed out. In the same way, if the cells and the normal fresh serum be added nothing will occur until immune serum is added, when hemolysis results.

In neither case is the complement in the normal blood serum fixed by either antigen or amboceptor alone, but can only be fixed when both antigen and amboceptor are combined with it. This fact led Bordet and Gengou to the discovery of complement fixation as a specific test for the differentiation of bacteria, for they found that by using a bacteriolytic and a hemolytic system together it is possible to discover the presence of a specific antigen or amboceptor in a mixture. The hemolytic system is used as an indicator, as hemolysis is visible to the naked eye, while bacteriolysis is not. For instance: If we add to (amb.) typhoid patients' serum, (ant.) culture typhoid bacilli, (com.) fresh guineapig serum, (amb.) rabbit's serum, (ant.) sheep cells—no hemolysis occurs—positive reactions. If we add to (amb.) normal patients' serum, (ant.) culture typhoid bacilli, (com.) fresh guineapig serum, (amb.) rabbit's serum, (ant.) sheep cells—hemolysis occurs—negative reaction.

From these experiments in bacteriolysis and hemolysis it will be seen that the principle of complement fixation can be utilized in the diagnosis of diseases due to a specific microorganism. This fact was recognized by Wassermann, Neisser and Bruck who applied it to syphilitic serum, and in 1906 published a paper giving their results in the diagnosis of syphilis by the complement fixation test. Wassermann considered the complement fixation reaction in syphilis as a true antigen antibody reaction, the fixation being due to the specific amboceptors present in the patient's blood, produced by the Treponema pallidum, the etiological agent of the disease.

This conception of the reaction was held by all observers until 1907 when several investigators demonstrated that complement fixation in syphilis occurred not only when an extract of tissues containing Spirochæta Pallidum was used as antigen, but also when nonspecific substances were used, as extracts of normal tissues. Although this is undoubtedly true, the practical application of the test in millions of cases of syphilis has proved that the test is practically specific for syphilis. As generally performed the Wassermann test is not a true specific reaction but it can be made so by employing antigens prepared from pure culture of Spirochæta pallidum.

PROCESS OF FIXATION.

Many theories have been advanced to explain the process of complement fixation in syphilis, but none of them rest upon sufficient experimental evidence to be acceptable. Noguchi proved that the substances which fix complement in the Wassermann test are acetone insoluble thus indicating that they consisted largely of lipoids, and further analysis showed that such antigenic extracts contained lecithin, cholesterin, and sodium oleate. Noguchi further believes that a positive result with pallidum antigen indicates the formation of true antibodies in the blood of the patient in abundance, while a negative reaction indicates their absence. These facts render it probable that the Wassermann reaction is of a dual nature when an extract of fetal syphilitic liver is used as antigen, in some instances consisting of a true antigen antibody reaction between specific antibodies in the patient's serum and specific substances in the antigen; and a nonspecific reaction between the lipotropic substances in the patient's serum and lipoids in the antigen. When the specific antigens are employed the Wassermann reaction does not occur as consistently as when nonspecific antigens are used nor does it occur in all stages of the disease.

FACTORS INFLUENCING THE REACTION.

There are a number of factors which may influence the Wassermann reaction rendering it falsely positive or falsely negative as the case may be. 1. Contaminated sera with Staphylococcus aureus, albus, or Bacillus subtilis may give rise to a positive complement fixation reaction in normal serum. Therefore, blood serum should be collected under aseptic precautions. 2. Blood serum containing bile will give rise to a false positive reaction. 3. The effect of alcohol upon the Wassermann reaction is very important from a practical viewpoint, even in our days of prohibition, and one which should not be forgotten when blood is collected for the Wassermann test. A negative reaction occurs inevitably after the ingestion of alcohol for about two days. 4. Shortly after general anesthesia positive reactions have been obtained in sera which have been proved to be normal.

CORRECT INTERPRETATION OF RESULTS.

The correct interpretation of the result of the Wassermann test is of utmost importance. One cannot but be impressed with the evident misconceptions of many otherwise able physicians regarding the exact significance that may be attached to a positive or a negative result of the Wassermann reaction. Many a patient is still being told that he is free from syphilis, the diagnosis being based upon a single negative result, while others are still being told that they have been suffering from the disease upon the strength of a weakly reacting serum or upon a reaction with the cholesterinized antigen only, in the absence of a history or symptoms of the disease. There is a surprising amount of lack of judgment regarding the interpretation of the various grades of reaction. The interpretation of the laboratory reports of the Wassermann test, such as positive, negative, doubtful, and anticomplementary results are left to the clinician.

A positive Wassermann reaction means the presence of spirochetes somewhere in the body, with a few exceptions such as yaws, leprosy, malaria, and scarlet fever. The lack of a history or of symptoms have no influence in deciding upon the treatment. Inhibition of hemolysis with the cholesterinized antigen only or by the ice box method of fixation is of value in treated cases only.

A doubtful Wassermann reaction in early latent or late latent cases must be considered as positive. But if no history of infection is obtained and no symptoms are present a doubtful reaction is not sufficient evidence upon which to base a diagnosis of syphilis. A doubtful reaction in a patient with a lesion that is suspicious of a primary sore is of diagnostic value.

A negative reaction is of no value in eliminating syphilis when a primary sore is suspected. In extragenital chancres the Wassermann reaction is of great value in enabling one to make an early diagnosis. A negative reaction is of great value when suspicious symptoms of secondaries are present and only when this reaction persists for several months are we justified in excluding syphilis. A negative reaction in patients suspected of tertiary syphilis is of no value in excluding syphilis unless it persists for several months. The blood is at times negative and the cerebrospinal fluid is positive in syphilis of the central nervous system. A single negative reaction where there is no history of infection and where no symptoms are present, is of considerable value as a corroborative sign that syphilis is not present, but where there is any suspicion that the disease may be present it has very little value in excluding syphilis. In treated cases a negative reaction must be obtained consistently for over a period of at least one year, the patient must present no symptoms, and the spinal fluid must also be negative before one may consider the patient cured.

VARIATIONS IN FIXATION POWER.

In the consideration of a negative reaction one must not forget the existence of a normal daily variation in the complement fixation power of syphilitic serum. The fact that the blood serum of an undoubted syphilitic may, during certain intervals of time, give a negative reaction in the absence of treatment and when previous and subsequent tests are positive, is of practical importance. This indicates the great value of repeated examinations when syphilis is suspected. A negative reaction in the newly born up to four months is of no significance in excluding syphilis. This has been well demonstrated by Dr. Williams in a series of fifty-eight hundred cases and proved the futility of the test in the early months of life, so much so that it has been abandoned as a routine examination in his clinic. Better results are being obtained in these early months by the use of the x ray.

The intensity of the Wassermann reaction in the various stages of syphilis is of considerable prognostic value. Persistently positive reactions, commonly called Wassermann fast, are indications of visceral or nervous syphilis and usually mean grave syphilitic infections.

SUMMARY.

1. The Wassermann reaction for all intents and purposes may be regarded as specific.

2. Great care and careful judgment must be exercised in the interpretation of the results of the Wassermann test.

3. A negative reaction may occur in a syphilitic due to the normal daily variation in the complement fixation power of syphilitic serum.

4. Contaminated blood may give falsely positive reactions.

5. Wassermann fast cases mean a grave infection and usually visceral or nervous syphilis.

6. A positive reaction with the cholesterinized antigen only or with the ice box method of fixation are of value only with a history or symptoms of syphilis.

7. The ingestion of alcohol previous to taking blood will render the reaction negative.

8. A positive reaction is obtained in normal sera shortly after general anesthesia.

9. Blood containing bile may give a positive reaction.

10. A negative reaction in the newly born for a period of four months is of no value.

11. A single negative reaction means nothing.

12. In a suspected case a series of eight consecutive daily tests should be done.

If these remarks are kept in the mind of the clinician whenever he seeks the result of a Wassermann test, there will be much less criticism of the value of the test, as well as of the laboratory worker, and patients will be benefited immensely.

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The Treatment of Gonorrheal Epididymitis*

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In recent years there have been a number of different methods brought forward for the treatment of gonorrheal epididymitis, several of which have attained considerable popularity and wide usage, while others have fallen into disuse. Any method that strives for universal acceptance must be simple in technic, give quick relief, and help shorten the course of the primary gonorrhea. This complication being a frequent one, it behooves us to formulate a course of treatment that will minimize as much as possible the enforced confinement of the patient to his bed.

It is generally agreed that the most important measures in the proper handling of this very painful condition are: 1, rest in bed, and 2, proper support of the scrotum. Whereas, the first of these is of great value in shortening the acute stage and reducing the temperature that generally accompanies it, the patient who is usually anxious to keep his disease secret, suffers considerable embarrassment and mental anguish when this course is made necessary.

LOCAL AND OTHER MEASURES.

Most of the local applications for the control of the pain in the offending organ depend upon the patient's stay in bed. Of these, the most commonly used are ice bags, hot water bags or electric pads, poultices and therapeutic lamps. The ice bag, though useful in checking the pain and inflammation during the early stage, is not so efficacious as heat in hastening absorption of the swelling. The hot water bag or electric pad is quite soothing and expedites resolution of the inflammatory exudate. Poultices, although efficient, are too troublesome to be of much value. The therapeutic lamp of high candle power effectively creates an active hyperemia which in turn lessens the pain. The drawbacks to this treatment are, 1, the handling of the apparatus is cumbersome to most patients and, 2, if not carefully used it can produce severe burns of the scrotum. Guaiacol and ichthyol are often used, but the objections to these are the soiling of the patient's clothing and the odor which generally betrays his secret. Vaccines are used by many, but the effects produced by these are quite problematical, and rarely, if ever, can it be claimed that they exert any immediate influence on the disease. The tight bandage applied to the affected part is generally too painful to be used with any degree of frequency.

For the support of the scrotum during the patient's stay in bed, the old Bellevue bridge of adhesive, stretched across the thighs, is very popular. The T binder and Jock strap are even better than this, if properly adjusted, since they can be used also when he is up and about. In severe cases the scrotum can be anchored up against the abdomen with adhesive in a number of ways.

EPIDIDYMOTOMY AND MULTIPLE PUNCTURE.

It has long been the aim of urologists to devise means to shorten the course of the disease and relieve the pain as quickly as possible. Chief among these is the operation of epididymotomy. Although there are a number of different modifications of this operation, that of Hagner remains the classical and the best. The proponents of this method assert that by early incision the vas deferens does not become occluded, and the likelihood of sterility is thereby materially lessened, but it is still too early to draw these conclusions. Whereas, the severe pain that generally accompanies the complication subsides almost immediately after the operation, the objections raised against this procedure are as follows:

1. It is a surgical procedure usually necessitating confinement at home or in the hospital. 2. It requires a certain amount of surgical skill. 3. In the hands of many operators, it means a mutilation of this important organ. 4. It often requires a general anesthetic to permit of a thorough exploration of the epididymis. 5. The convalescence of the patient and healing of the wound are often greatly delayed. 6. The induration left after the operation is often more pronounced than after the more conservative methods. 7. Many patients object to any and all surgical interference. By many, this operation is still considered to be one of last resort, done only when the pain is persistent, or when frank suppuration exists.

Next in importance is the multiple puncture of the inflamed epididymis with a needle and the simultaneous injection of procaine solution. The principle of this procedure is the riddling of the distended tunica vaginalis, permitting the serum to exude out into the surrounding tissues and relieving the tension within. At the same time the procaine tides the patient over the immediate effect of the operation. While the pain subsided very quickly in a fairly large proportion of cases in which this method was used, the procedure itself is quite painful and often excruciatingly so. Furthermore, one injection does not always suffice and the patient as a rule is loath to undergo a second treatment of this kind. The procedure is also unsurgical, and unless done under strictly aseptic conditions, may result in a secondary infection of the scrotum and its contents which may be far worse than the original condition we set out to treat.

SODIUM IODIDE INTRAVENOUSLY.

During the past twenty-one months after reading the observations reported by Dr. Maximilian Stern, of New York, I have been using a sterile solution of sodium iodide intravenously as a routine in all my cases of epididymitis, with results that seem to be more uniformly satisfactory than with any other existing form of treatment. My personal experience with this drug in about ninety cases has been very encouraging. In addition to these, I have been fortunate enough to follow up very closely an additional sixty or seventy cases belonging to my colleague, Dr. V. H. Pentlarge. Since the adoption of this method, the bedridden patient has been the exception rather than the rule.

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*Read before the East New York Medical Association, Brooklyn, N. Y., February 15. 1922.

The average number of injections necessary is four or five, some requiring only two or three, while others as many as eight or ten. Usually within twenty-four hours after the first injection there is a varying degree of improvement, which at times amounts to almost complete subsidence of pain. Others require two or three injections to obtain these results. When given early in the course of the complication the results are often quite rapid, the pain, tenderness, and swelling subsiding very quickly. This naturally enables us to resume treatment of the urethritis at quite an early date. In the majority of cases the induration remaining in the epididymis at the end of three or four weeks is quite negligible, in the remainder, it is at least considerably less than with the other methods.

There is usually no need for intercepting the patient's visits to the physician's office when the unfortunate complication occurs, as with the early use of sodium iodide and the proper support of the scrotum there is rarely any need for treatment in the hospital or at the patient's home. The great majority can go about their business without much difficulty and the secrecy with which the disease is generally surrounded is not betrayed as it is with most other methods.

The injection is a safe office procedure, takes only a few moments to administer, and if properly done causes no pain. It does not require any elaborate paraphernalia, nor does it require any particular skill on the part of the physician. If proper aseptic precautions are observed, it is not followed by chills, fever, or other untoward effects. Although the solution should be injected into the vein, no sloughing occurs if it is injected into the surrounding tissues, the only result from this accident being a burning sensation of varying intensity at the site of injection which lasts about ten to thirty minutes. In two instances, in my series, shortly after the injection and lasting several hours there developed a swelling of the salivary glands which was accompanied by pain on movement of the jaws. Some patients complain of the intensely bitter taste of the iodide which may last as long as twenty-four hours.

None of these socalled drawbacks, however, are serious enough to contraindicate the use of this drug. With variations depending upon the patient and his condition it is generally given every other day for the first three or four doses, and then every third or fourth day thereafter until the desired effect is obtained. The solution is put up in sterilized, sealed ampoules, each containing two grams of sodium iodide in isotonic base. One ampoule constitutes the average dose. It should be administered warm and to do this the ampoule is heated slightly in warm water before opening it. Since no reaction follows the injection, there is no need for starving the patient previous to the treatment nor is there any necessity for rest afterward.

Naturally, in addition to the intravenous medication, proper support of the scrotum, attention to the bowels and avoidance of undue exercise should be observed. Guaiacol and diathermy applied to the affected organ help to hasten resolution.

The following case histories selected from my records at random are typical of the results obtained by this method:

Case I.—M. W. came to me with an anteroposterior gonorrheal urethritis, prostatitis, and seminal vesiculitis; a left epididymitis had developed during the eighth week of the disease. On April 25, 1920, he was given two grams of sodium iodide intravenously and diathermy applied to the epididymis. The next morning the symptoms were slightly aggravated but later in the day his condition improved materially until the following afternoon, when the pain increased slightly. On April 27 the second dose of sodium iodide was given, following which he felt better until the next evening, when he had a recurrence of the pain which lasted several hours. On April 29 the patient felt much better, the epididymis being less tender. He was then given his third and last dose. On May 1 the condition was considerably better, the epididymis being much smaller and much less tender. On May 5, the epididymis was no longer tender and was only slightly enlarged and indurated. On this date, only ten days after the onset of the complication, intraurethral treatment was resumed. Four weeks after the last injection there was scarcely any induration noted in the lower pole of the epididymis. The patient did not lose a single day from business.

Case II.—W. S.—During the third week of the disease, while cranking his car, this patient developed a large and tender right epididymis, and on November 6, 1920, received his first dose of sodium iodide. Two days later, on November 8, the epididymis was about the same in size but less painful, and the patient received his second injection. On November 10 the third injection was given and the epididymis was found to be smaller and less tender. On November 12 he was considerably improved, the epididymis becoming rapidly smaller and only slightly tender. He was then given his fourth dose. On November 15 the fifth injection was administered, the epididymis being much smaller and no longer tender. On November 19 the lower pole of the epididymis was only slightly enlarged and not tender. On this date he received the sixth and last dose of sodium iodide. On November 20, only a slight amount of induration remaining in the epididymis, local treatment of the urethra was resumed.

Case III.—L. B.—When first seen by me on June 13, 1921, this patient had been in bed for two days with a large and tender right epididymis acquired during the third week of urethritis. He was then given his first dose of sodium iodide. Two days later his condition was so much improved that he was able to come to my office where he received a second dose. On June 17 he was still better, the epididymis being distinctly smaller and less tender and painful, and the third dose was then administered. On June 20, when the fourth dose was given, the patient felt much better and the epididymis was considerably smaller and only slightly tender. The condition on June 22 was much improved, the epididymis no longer being tender and only slightly enlarged. He received the fifth dose on that day. On June 24, as the patient showed great improvement and the epididymis was only slightly indurated and not tender, intraurethral treatment was resumed. This patient was a taxicab chauffeur and on July 17, after cranking his car, the right epididymis again became tender, painful and slightly enlarged. Two doses of sodium iodide at an interval of three days promptly cleared up his condition.

Case IV.—E. W., an actor.—This man's urethritis began four months before he was seen by me. One month after the onset of the gonorrhea a right epididymitis developed which confined him to his bed for ten days. On May 7, 1921, he came to me with a large painful and tender left epididymis of four days' duration. He was given an ampoule of sodium iodide, and two days later another dose was injected. He did not report again till May 17th when his condition was much improved, the epididymis being much smaller and no longer tender. He then received his third dose of sodium iodide. On May 20, after a dancing act, the swelling having recurred, he received a fourth dose. On May 24, although he felt better and the epididymis was much smaller and not tender, a fifth injection was administered. On May 28, the epididymis being only slightly indurated and not tender, intraurethral treatment was begun.

In conclusion, I desire to emphasize the superiority of the intravenous use of sodium iodide over all other existing methods in the treatment of the majority of cases of acute gonorrheal epididymitis. It cannot be argued that the splendid results obtained are due to the scrotal support, guaiacol and diathermy which many of my patients have received, as these same measures were carried out previous to the use of sodium iodide without obtaining the splendid results seen since this procedure was started. The increased rapidity of resolution is probably due to the well known properties of the iodides in producing a more active diapedesis and phagocytosis. It is asserted by others that the iodides might hasten absorption indirectly by its influence on the thyroid. In short, this method recommends itself for more general use on account of its simplicity of administration, freedom from danger, and above all its action in hastening the relief and cure of this painful complication.

Cases V and VI will appear in the author's reprints.

Keratosis Blennorrhagica or Gonorrheal Keratosis*

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My first experience with gonorrheal keratosis was in Etaples, France, in the fall of 1917, Fifty-first General Hospital, British Expeditionary Force. It was at this time that venereal diseases had reached such alarming proportions as to cause serious loss of man power to the British Army. The formation of these enormous venereal hospitals or camps was the result. LeHave and Etaples were the largest; at that time we had about three thousand five hundred to four thousand patients, who were hospitalized and confined to camps which were closely guarded.

The entity was first recognized and reported by Vidal, a French physician, in 1893. Following Vidal's report a period of seventeen years elapsed before this rare disease was described in the English literature. In 1910 Turnbull and Sequeira, both Englishmen, reported the identical condition as described by their French colleague. Simpson, of Chicago, was the first American to describe it and present a report at a meeting of the American Medical Association in 1912. With the exception of the reports of Haase and Wadrack, this seems to constitute our only contributions on the subject. In searching the literature it was with some difficulty that these were found.

It is practically always associated with gonorrheal arthritis. But there are a few cases reported without joint involvement. Lundie, who described it graphically at our hospital in France, in writing for the *British Journal of Surgery,* speaks of two forms, namely, the localized involving the feet and hands, and the generalized forms upon the extremities. The clinical appearances of patients, to my mind, vary too greatly to fit into such a category. Characteristic lesions vary in size from a pea to larger waxy nodules, discreet and comparatively few in number. They begin as small conical protuberances, hard to the touch like corn, and are painless.

The French speak of these lesions as dry blisters, or dry hyperakeratosic pyodermia, which certainly is an admirable term for them.

These hard, domeshaped crusts tend to become brownish in color as the case progresses, resembling rupia, with which it is often confused. Under treatment, or with improvement of the gonorrheal infection, these coneshaped masses wither and drop off, leaving a pink base with no infiltration or permanent scarring, thus differing from the syphilides.

Often in the same case, as in the patient now in our ward at the Jefferson Hospital, the toes, especially on the plantar surface, present a condition simulating chilblain, the skin is tender, with distinct swelling, later becoming dry and crusted, extending down the soles of the feet. Sequeira aptly likens it to the mountain ranges on a relief map.

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*Read before the Philadelphia Urological Society.

Again one sees a general plantar keratosis. I recall a frightfully severe case in which there was an imperfect cast of the foot exfoliated, which was exhibited as a curio to visiting physicians.

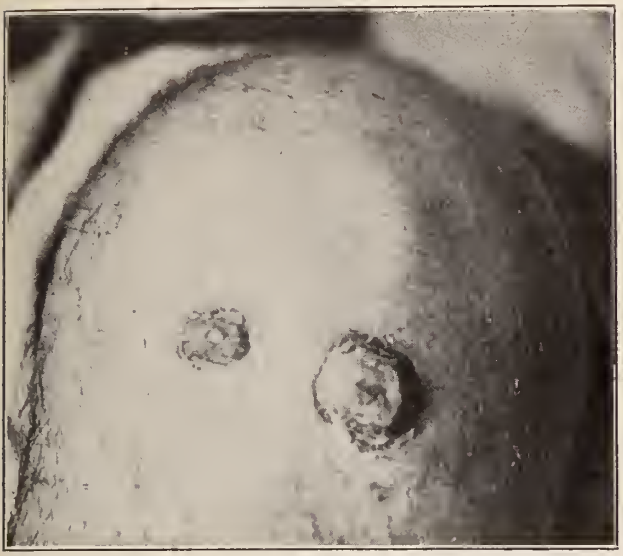

Fig. 1.—Elevated crusts on right knee in case of keratosis.

The French, who up to that time had recorded about twenty cases, believed the skin condition to be absolutely characteristic. The incidence and comparative frequency of these rare conditions at our hospital for a period of over nearly a year I cannot explain. The debilitated and cachectic condition of many of these unfortunate men, combined with the gonorrheal systemic infection, and often a history of repeated infections, which for the most part were purely relapses or recurrences, plus the rigors of a long war, may be the answer; or again, it is reasonable to assume that with such a tremendous number of cases with long standing Neisserian infection, often neglected, or with no treatment, corralled as they were there, might possibly have produced the same proportion elsewhere.

I cannot but feel that debility, cachexia, long standing local infection, or virulent systemic infection by the gonococcus is the causative factor in this peculiar and unusual epidermal manifestation. Pathology and histology regarding these crusts is far from satisfactory; hypertrophy of the epidermis, with edema and infiltration of leucocytes, increased plasma, and round cells. It is the consensus of opinion that it is a parakeratosis, and not a true keratosis. Small sections of tissue from the skin lesions and epitrochlear glands were inoculated in various culture media; some of the materials were used to inoculate rabbits and the French have even tried to inoculate men. Smears and cultures from the serum of succulent lesions were all negative. The nearest approach to any exact or definite pathogenesis is reported by Wadrack in 1917, who demonstrated in his case a few gram negative diplococci closely resembling the gonococcus. All other cases were negative to bacteriological findings.

The case which I report herewith is one taken from the service of Dr. H. R. Loux, at the Jefferson Hospital. The history of this patient is as follows:

Case.—Patient gave a history of gonorrhea at the age of seventeen years, and again at the ages of twenty and twenty-one years; he denied lues. His present illness began six weeks prior to his admission to the hospital. An acute anteroposterior urethritis developed, with marked symptoms of deep urethral involvement. The same day the patient complained of severe pains in left shoulder and arm and two days later in the elbow and wrist. Two weeks subsequent a right ophthalmia occurred which gave him much trouble. At this time the patient noticed elevated conical nodules scattered here and there, about a half inch in diameter, arising from the skin surface, and also a thickening of the toes and soles of the feet.

Physical examination on admission showed a well nourished adult male, with marked pallor and a slight elevation in temperature. He complained of pain in the right hip and ankle joint but they were greatly inflamed, and on his admission there was great tenderness with a tendency to localize. There were a number of elevated crusts, waxy in appearance, on the right knee, thigh and hip and left leg and back. There was marked thickening of the plantar surfaces of the feet, and the toes were swollen and reddened, with a marked tendency to hardening. The face and scalp were free from lesions. Wassermann test was negative; urethral smears positive for gonoccoci. The prostate was not examined owing to the marked posterior involvement, precluding collection for bacteriological examination. X ray findings of joints showed no pathological condition of bones. The ophthalmologist's report of the eye condition was metastatic gonorrheal iritis. The treatment consisted of phylacogens, rest in bed and forced fluids.

The treatment used in the cases that came under my observation while in the service in France and which was the accepted and routine therapeusis for this condition was McDonagh's colloidal therapy, consisting of such agents as manganese, antimony and colloidal sulphur which is known as intramine. And to date I have never seen any remedial measures which approach them for efficiency. This treatment was also the recognized therapeutic (systemic) for all gonorrheal complications. The relief and improvement of joint involvement was at times almost theatrical.

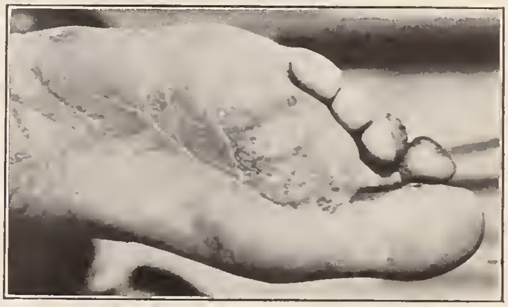

Fig. 2.—Plantar surface of foot, showing resemblance of chilblains to keratosis.

4218 Walnut Street.

Infection of the Kidney*

Some Present Day Considerations

By WILLIAM C. QUINBY, M.D.,
Boston.

Infections of the kidney, forming as they do a frequent and an important disease complex, have for many years been the subject of extensive research and clinical observation by the bacteriologist, the pathologist, the internist, and the surgeon, alike. And as a result there has accumulated a vast literature dealing with this subject. It is by no means my purpose to attempt to reconcile and to correlate the manifold aspects presented by this voluminous literature, even were I able to do so, for much of it is confused, but to bring to your attention certain points on which there is general agreement at the present day, and then to offer for your consideration some data which have been obtained during the past year at the Laboratory of Surgical Research of the Harvard Medical School and in my clinic at the Peter Bent Brigham Hospital.

For many years it has been generally appreciated that two outstanding and evident routes exist by which it is possible for infectious organisms to reach the kidney; the one by way of the blood stream, the other upward through the urinary passages. The first of these has been called the descending route, the second the ascending. Though older writers were almost unanimous in their statements that infection reached the kidney from below, it soon became clear to such accurate observers as Albarran and, later, Rovsing, that in many instances the facts failed to support this assumption, and that it was necessary to look to the circulating blood stream to explain the existing conditions. Strong support was brought these views by the demonstration by several observers, notably by the work of Biedl and Kraus, that virulent, living microorganisms may and frequently do pass through the kidney and as frequently leave it intact. Thus, to the liver, intestine, and spleen was added one more organ by the activity of which nature can rid the human organism of bacteria. And this property of the kidney is a basic one, holding true for all bacteria as well as for inert particulate matter, if this be of a size sufficiently small. This fact is universally accepted as true today and therefore needs no further emphasis.

But if the kidney is able to transmit organisms without demonstrable detriment to itself, it becomes necessary to look further for the reasons why it may at times become the seat of inflammation often leading to serious crippling of its function or even to its complete destruction. Two outstanding reasons are evident; the first concerns the virulence and quantity of the infecting organism; the second is found in stasis within the organ itself. It has been said that, though the kidney will permit the passage of living bacteria, it does not do so from choice, but from necessity; and of course this is true. There is, in other words, a definite and rather low limit in the number of bacteria which can thus be disposed of. Organisms of high virulence and in large numbers on reaching the kidney by way of the blood stream cannot be eliminated, but remain to cause infection. This infection is thus seen clinically to be of many varying degrees of severity, from those acute fulminating conditions so clearly described by Brewer, down to the transient, mild, and often almost symptomless conditions, the socalled pyelitis.

A second potent contributing cause of infection of the kidney is found in any circumstance which slows down the mechanism by which the kidney rids itself of its product, the urine, and thus brings about stasis of greater or lesser degree. Under normal conditions the urine in the renal pelvis is carried down the ureter by the propulsive force of the ureteral peristalsis. These waves of muscular contraction beginning in the pelvis course downward producing a normal intrapelvic pressure which is very low. Indeed when peristaltic activity is greatest, as in conditions of marked diuresis, this pressure may even be of slightly minus value so that there is an approach to a slight suction effect. Impediments to this mechanism come most frequently from stone, ureteral angulations due to ptosis, tumors, or anomalies in the renal bloodvessels. Clinical examples of infection of the kidney secondary to such causes are familiar and will be readily recalled by all.

Infection thus reaching the kidney by the blood stream is of necessity transmitted to the blood from some preexisting focus, so that of late much attention has been paid to finding such localization, whether it be in teeth, tonsil, bowel, or whatever; for in removal of the original focus lies the best assurance of ridding the patient permanently of his difficulty.

The recognition of the facts above sketched concerning blood borne renal infection is so important and their elaboration so attractive that today there are some who practically deny that the kidney ever becomes infected except in this manner, and, by implication at least, consider the older ideas of infection ascending up the ureter as untenable and not proven.

That infection should reach the kidney by ascent from below presupposes, of course, the existence of a cystitis. Knowing as we do today the remarkable resistance of the bladder mucosa to infection under ordinary conditions, it becomes at once evident that the view which holds the source of infection of the kidney to be by way of the blood stream must be true in the large majority of cases. Circumstances occur, however, notably in disease of the lower urinary tract, such as stricture, prostatitis, or enlargement of the prostate in men, and cystocele in women, which lead to frequent infection of the bladder. The problem, then, concerns those conditions which may or may not permit the upward propagation of bacteria from bladder to kidney.

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*Read before the New York Academy of Medicine, December 15, 1921. *(From the Urological Clinic of the Peter Bent Brigham Hospital.)*

There are two ways by which one may conceive bacteria reaching the kidney from the bladder; the first by way of the lymphatics, the second by way of the lumen of the tube. The first of these routes has never been satisfactorily proved, although several experimental attempts have been made to do so. None of this work will bear careful criticism, and indeed the very segmental character of the lymphatic system about the ureter, as determined by the anatomists, makes direct transportation of bacteria from bladder to kidney highly improbable. There remains the lumen of the ureter itself. Here the objection is immediately raised that against the current of urine itself, as well as against the contracting muscular peristalsis, bacteria have no sufficient power of motion to ascend. And of course this objection is entirely valid. It is pointed out that only in those instances where the ureterovesical valve has become incompetent and the ureter a dilated tube with indurated wall can there be any approach to conditions which would permit such ascent of bacteria. But that there is still another method by which portions of the fluid contents of the bladder may spontaneously reach the kidney, and that this has not received sufficient consideration either by the physiologist or clinician, is a fact which I wish especially to bring to your attention. I refer to the socalled ureteral reflux. (Reports from the Surgical Research Laboratory of the Harvard Medical School dealing with this subject have already been made) (1, 2, 3).

This phenomenon first demonstrated by Lewin and Goldschmidt in 1893, and later amplified by Courtade and Guyon, is distinctly not a retroperistalsis. This is amply shown in the work of Penfield. What actually happens is best described by quoting from the paper of O'Conor and Wislocki.

"Rabbit 1.—Male. October 7, 1919. Ether anesthesia. A number seven F rubber catheter is inserted into the bladder, the bladder emptied and the urethra tied off with the catheter still *in situ*. A laparotomy is next performed and the ureters are exposed under warm, physiological salt solution. Peristaltic waves can be observed traveling at regular intervals down the ureters, averaging one to two a minute with a speed of approximately thirty to forty mm. a second. This is watched for some minutes. A syringe containing twenty c. c. is meanwhile filled with warm saline stained with methylene blue. The syringe is attached to the catheter and the methylene blue solution is gradually injected into the bladder so that it becomes moderately distended. While the ureters are under observation a column of blue fluid suddenly fills the lumen of the right ureter. A peristaltic wave which has already left the renal pelvis meets the ascending column in the upper half of the ureter and impedes its progress. Fresh peristaltic waves commence above, becoming more frequent and vigorous and a struggle ensues for control of the ureter. The column of fluid advances towards the kidney and recedes again with each peristaltic wave. Gradually the peristaltic waves completely expel the methylene blue from the ureter and the ureterovesical orifice closes. The peristaltic waves quickly subside and resume their former frequency of one to two a minute. This phenomenon repeats itself in a few minutes on the same side and also in the left ureter." Occasionally the ureters are unable to expel the invading fluid. The following instance illustrates this occurrence:

"Rabbit 4.—Male. November 10, 1919. After the initial procedures as described in the preceding experiment have been carried out a column of blue fluid is suddenly seen entering the right ureter. Vigorous peristaltic waves attempt to expel the fluid in the ureter, but after a few minutes it is observed that the ureter is becoming more and more distended with methylene blue solution while the ureteral contractions are becoming feebler and feebler. Finally the ureteral movements cease entirely and the invading fluid takes complete possession of the ureter and renal pelvis."

The following experiment is cited as an illustration of the rôle played by peristalsis in regurgitation:

"Rabbit 15.—Male. November 13, 1919. Ether anesthesia. The bladder is emptied and a catheter tied into the urethra as usual. A laparotomy is performed. The ureters are quiescent, no peristaltic waves occur while the ureters are watched for several minutes. Methylene blue solution injected into the bladder fails to enter either ureter. After removal of the solution from the bladder and reinjection of it several times without any success, five tenths c. c. of a one per cent. solution of barium chloride is given intravenously. The musculature of the ureters responds to barium chloride by increased peristalsis and in this instance vigorous injection. As the first peristaltic waves reach the bladder a column of blue fluid ascends each ureter with great suddenness. The peristaltic waves increase rapidly in strength and frequency and the methylene blue solution is gradually expelled from the ureters and the ureterovesical sphincter closed."

That the fluid which is thus driven upward into the ureter reaches the kidney parenchyma and thence the general blood stream is easily shown by the use of a suspension of particulate matter such as india ink (used recently by Graves) or by the introduction of some poisonous agent such as strychnine. When the fluid injected into the bladder contains ink, particles of this, after the reflux has been produced, can be found in the kidney itself, in the liver, lungs, spleen, and even in the other kidney which has been excluded from the bladder by temporary closure of its ureter. Also in their report made in 1896 Lewin and Goldschmidt described the following experiment:

"There was injected into the bladder of a male rabbit a colored solution containing thirty-five one hundredth grains of hydroxylaminechlorhydrate. (This agent has the property of changing the hemoglobin of the blood into methemoglobin which can be seen by the spectroscope.) Almost immediately the fluid passed up the ureter. Eight minutes later blood taken from the mesenteric vessels showed methemoglobin and the animal died ten minutes after the injection was made." The same sequence of events can be shown when strychnine or other soluble poison is used.

Further work dealing with the conditions under which this reflux may be produced has been undertaken by Dr. Graves, and, though it is not yet complete in all respects, he has found that one essential is a sufficient degree of bladder tonus at the time the reflux occurs. It can never be produced in the presence of a flabby, relaxed bladder. This is in accordance also with the well known fact that it is quite impossible to force fluid up the ureter in the flaccid bladder of the cadaver. A second fact which Dr. Graves has determined is that, while the reflux occurs at widely differing degrees of intravesical pressure, a quick elevation of this pressure is more potent in the production of the reflux than a slow one. This is suggestive of the pressure alteration which occurs during the normal act of urination, a point which will be referred to later. The possible irritative qualities of the injected fluid or its degree of heat or coolness have seemed to play but little part. Other possible factors are being investigated, and will form the subject of a later communication by Dr. Graves.

These being the facts as learned thus far from the experimental laboratory, it becomes of immediate interest to determine whether this reflux is a phenomenon entirely confined to such laboratory animals as the rabbit and dog; or whether it can be produced or observed to occur spontaneously in man. We have therefore been attempting to produce the reflux in suitable patients by introducing into the bladder a solution of bromide of sodium while observing at the same time the ureters by means of the fluoroscope. In somewhat over half our observations it has been possible to see a column of opaque solution suddenly penetrate either one or both ureters. Indeed this result was to have been expected from the evidence brought forth in a series of cystograms published by Kretschmer in 1916. In a number of normal individuals after filling the bladder to examine its outline by x ray the plates were found to show that the injection fluid had penetrated upward into either one or both ureters.

The importance of this reflux, if it prove to be as common a phenomenon as now seems to be the case, is great for the problem of the ascending route of renal infection. Let us see if clinical experience brings any evidence which makes the activity of the reflux a fair presumption.

Two occurrences stand out immediately. The first is the socalled catheter or urethral chill. Here a short time following the passage of an instrument into the bladder there occurs a rigor which may or may not be succeeded by infection of the kidney of a degree and form usually described as a pyelitis. The rigor doubtless represents the response of the body to the introduction into the circulation of foreign material. Therefore it has been assumed that a lesion of the mucous membrane has been caused, presumably in the deep urethra, through which bacteria gain entrance into the blood stream. This assumption has always seemed to me highly improbable because the reaction occurs too quickly and directly after the passage of the instrument and also because this manipulation is frequently performed without the least indication of trauma being caused as evidenced by either pain or bleeding at the time. It would seem to me that a far better explanation of the catheter chill is found by assuming that a bladder for some reason more irritable and hypertonic than normal has been stimulated to contract suddenly by the passage of the instrument, and a reflux of a portion of its infected contents upward to the kidney thus brought to pass. Once having reached the kidney, this material finds ready access to the circulation as has been shown above.

There is a second clinical phenomenon which I feel can be logically explained only by the operation of this ureteral reflux. During the convalescence following prostatectomy the patient occasionally suffers a sharp rise of temperature often lasting but a day, sometimes accompanied by a definite chill, occurring a considerable time after operation, and following a period of entirely normal temperature. Examination may show tenderness in one or the other loin over the kidney. Careful observation finds that this evident infection of the kidney, usually mild and transient, occurs just after the suprapubic wound has healed to a sufficient extent so that urination per urethram has taken place for the first time since the operation. The postoperative notes of patients in hospital before we had become interested in this subject of urethral reflux will illustrate this point:

Case I.—A man of fifty-five, in poor general condition, entered the hospital for the relief of acute obstruction of urine. The cystoscope showed an hypertrophied prostate and a bladder otherwise normal except for some evidences of infection. The ureteral orifices were normal. The bladder was opened under local anesthesia. One month later the prostate was removed. Twenty-two days after this, his temperature having been normal for two weeks, we find the following note: "Today after beginning to void by urethra patient had a chill with temperature of 103°, returning to normal in about twelve hours." There were no other ill effects and the remainder of his convalescence was uneventful.

Case II.—A man of sixty years had the bladder opened above the pubes preparatory to prostatectomy. Nine days later the prostate was enucleated. Fourteen days later we find the following note made by the house officer: "Three days ago for some unexplainable reason the patient's temperature reached 102, pulse 130, and respiration 30. Examination at this time revealed nothing remarkable. He felt quite well and noticed no unusual signs. He was immediately put to bed and has remained there since with subsiding fever. Three days ago he began voiding per urethram, since which time the suprapubic drainage has decreased. The urine remains quite cloudy."

Other similar instances of this occurrence are not hard to find or rare. They seem to me clearly to be best explained by assuming that the bladder, for a longer or shorter period quiescent, has become hypertonic; and on first resuming its function of the expulsion of urine has caused the reflux to appear, resulting in the upward transfer of infected material to the kidney.

These then are some of the considerations which I wish to bring before you regarding the ascending route of infection of the kidney. I must ask your indulgence for their rather fragmentary nature at the moment.

And now just a word in closing is necessary relating to our present views regarding treatment of renal infections in general, however they may have originated. Our strongest weapon is water by the diuretic action of which the kidney is enabled to rid itself of the infecting organisms. Water should be considered as a medicine or drug and as definite orders given concerning its administration as would be given in the case of morphine. The amount which should be administered must reach 3,500 to 4,000 c. c. in twenty-four hours. In the patient in whom infection of the kidney is acute and prostrating and causing a definite lowering of renal function, there will frequently be found an irritability of the stomach and intestine which will prevent the administration of this entire amount of water by mouth. One must then resort to administration by rectum or better still by hypodermoclysis. On this must be our chief reliance. The only drugs which have proved of any value at all are salol and hexamethylenamine, and either of these is at best but feeble. We still use them today more from habit and with the thought that they can do no harm, rather than because of any firm belief in their antiseptic value. Vaccines are of no value whatever. The removal of the primary source of infection, the one to which that in the kidney is secondary, is of course a very important matter whether this be found in the urinary tract itself, or at some distant region of the body. The local treatment of renal infections by injection of solutions into the renal pelvis is a very important procedure concerning the value of which there can be no doubt. A discussion of this, however, would carry us beyond the limits of the present paper.

In conclusion I wish to emphasize the great importance of early recognition and treatment of infections of the kidney, and that whether acute or chronic, blood borne or ascending, these infections are always secondary to a primary focus elsewhere than in the kidney itself. Therefore if a cure can be accomplished by means other than nephrectomy, it will be most assured after this primary focus has been adequately controlled.

REFERENCES.

1. Penfield, W. G.: Contraction Waves in the Normal and Hydronephrotic Ureter. *American Journal of the Medical Sciences,* July, 1920, vol. clx, No. 1, p. 36.

2. Wislocki, G. B., O'Conor, V. J.: Experimental Observations Upon the Ureters, with Especial Reference to Peristalsis and Antiperistalsis. *Johns Hopkins Hospital Bulletin,* vol. xxxi, No. 352, June, 1920.

3. Graves, R. C.: Is carrying on further work.

Diagnosis and Therapy of Certain Lesions of the Urinary Tract*

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As practitioners, men whose duty it is to guide the patient correctly along the road to a proper interpretation of his symptoms, I shall present my paper. For I am addressing a group of men whose work is even more important than that of a specialist, since it presupposes a working knowledge of all the specialties, a knowledge adequate and comprehensive enough to be tantamount to a quick, almost intuitive insight into the character, significance and diagnostic indications of the symptoms of all of the diseases. It is, however, only through the acquisition of the varied viewpoints of those versed in the different specialties, that the practitioner can amplify his medical concepts so as to be of greatest benefit to the patient.

It is in the field of urology particularly that, I am sorry to say, much apathy, an antiquated mental attitude, one savoring of the last generation, a lack of appreciation of the modern method of cystoscopic procedure, and a not infrequent temporizing as well as intravesical tampering, are among the culpable views and acts that can be frequently laid at the door of the busy practitioner. When, in answer to my suggestion that a patient who has been ailing for months with vesicorenal symptoms be subjected to a cystoscopic examination, I hear the doctor say: "Don't you think that cystoscopy is rather a serious matter, and do you think it necessary, as yet?" Is it not, then, time for the invocation of a drastic polemic against those, who keep so little abreast with modern diagnostic methods?

If I shall be able to do nothing more than to point out by illustrative examples now and when the most improved diagnostic and therapeutic urological procedures should be applied, I shall be content. If by clinical illustrations and pathological demonstration I shall be able to expose the dire effects on the urinary function of procrastination in the diagnosis of renovesical diseases, I will hope to have accomplished my aim.

URETERAL CALCULUS.

To those whose practice has offered but scant examples of ureteral stone, it may be worthy of note that both in a diagnostic way, as well as for immediate therapeutic benefit, the urologist possesses means of giving appreciable aid. The frequent error of interpreting vague abdominal pain in the lower right quadrant of the abdomen as indicative of appendicular affection is now so well known that mere mention need be made of it here.

In women a routine vaginal examination will not infrequently disclose to the palpating finger the presence of a calculus in the lower ureter, when symptoms of chronic appendicitis are presented, so this examination must regularly be made whenever permissible.

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Although the value of positive urinary findings, such as abnormal cellular elements, particularly red blood cells, when associated with the symptoms of renal and ureteral colic, is not to be deprecated, the absence of abnormal cells is quite compatible with the existence of unilateral disease of the urinary tract. For one must never forget that when the ureter becomes obstructed by a calculus or stenosis of other nature, the urine may fail to reflect the usual concomitant pathological urinary elements. For light we must, therefore, have recourse to radiography and cystoscopy, and of these two the latter is perhaps the more important.

CALCULI WITH NEGATIVE X RAY FINDINGS.

We must never be satisfied to exclude the diagnosis of ureteral stone on the basis of a negative x ray, for it is well known that a large proportion of calculi of uric acid or urate nature throw no shadow on the plate, even though the patient is of but slight stature. For instance, when you are called to a patient who is suffering from renal colic or pain in the lower quadrant along the ureter, radiating in typical fashion, you must not be willing to rule out urinary calculus because on a previous occasion the x ray examination had been negative.

It is when the patient is in an attack that the most valuable assistance can be gained from intervention with the cystoscope, both to diagnose doubtful cases, where the symptoms are obscure, as well as in a therapeutic way.

During an acute attack, which has not all the earmarks of ureteral or renal colic, and which leaves you in some doubt as to whether a gallbladder or appendicular affection is present, and where the urine is negative, it is quite permissible, in the absence of temperature or other threatening signs, to keep the patient under observation. Should, however, the symptoms persist, the colic continue after the first twenty-four hours, and when adequate relief is not had from the injection of morphine, and when continuous injections would be necessary to relieve the suffering, your doubts should be cleared, once and for all, by a combined cystoscopic and radiographic examination.

In what way can the application of the cystoscope be of more value during an attack than after all symptoms have subsided? Too often do we hear the medical man's advice to the patient and even the same statement to the urologist, to wit—"I shall have the patient thoroughly examined after the attack is over." No greater error of judgment can be made than this temporizing or attitude fearful of the application of the cystoscope whilst symptoms are in evidence. For, when the attack is over, particularly when the x-ray is negative, the findings with the cystoscope may be nil; and, furthermore, that great therapeutic benefit, which is most frequently derived by the introduction of the ureteral catheter, will be lacking.

So what shall your attitude be? When the attack of pain does not subside within the first twenty-four hours, but is repeated and the patient complains of constant lumbar ache with or without radiation, you should at once be prepared for a combined radiographic and cystoscopic procedure.

After complete purgation with two ounces of castor oil, a routine x-ray examination is made, the plates immediately developed, and whether positive or negative, cystoscopic examination is proceeded with. If a shadow of doubtful nature is present, its identity is determined by employing a shadowgraph catheter on the side on which it lies.

CYSTOSCOPIC FINDINGS DURING AN ATTACK.

In the bladder we occasionally see the harbingers of descending ureteral stone in the form of multiple submucous hemorrhages that bear the earmarks of recent origin; or, we may see the evidences of the proximity of the calculus to the bladder orifice in an edematous condition of the ureteral lips, or a generalized intrusion of the ureteral mound.

The careful introduction of the catheter will encounter an obstruction. Or the catheter will meet a slight resistance which it passes readily and suddenly evacuate a considerable quantity of urine in a rapid gush or continued stream. From ten c.c. to fifty c.c. or more may be collected without interruption, the amount depending upon the degree of distention of the renal pelvis and ureter. Almost immediately upon the emptying of the retained fluid, the patient experiences relief in the loin and ureter region, and, in this sense, the application of the method is not only of diagnostic, but of considerable therapeutic worth. Hence more is accomplished by the mere introduction of the catheter and the immediate emptying of the retained fluid than by repeated injections of morphine, or by benzyl benzoate or other antispasmodics.

Where the catheters meet an apparently insurmountable obstruction in the ureter, special manipulation will frequently permit us to overcome such obstacles, and to empty a distended renal pelvis. The experienced cystoscopist will rarely fail in the cases of an acute obstruction of the ureter by calculus, to pass the catheter beyond the stone. It is, however, not infrequently the case that as a sequence of successive colics with descent of the stone, impaction into a narrowed portion of the ureter takes place, particularly near the ureteral orifice, where the incarceration may be such, as to preclude the passage of even the smallest ureteral catheter.

This brief résumé will acquaint you with the wisdom of the early application of the cystoscope, when there is a frank indication, such as renal colic, and where immediate relief may be obtained as well as diagnostic assistance.

We also have methods at our disposal for facilitating the spontaneous expulsion of calculi when they are not too large. Whilst the use of intraureteral injections of glycerin, oil, papavarine, benzyl benzoate, and other drugs in solution are indicated to produce relaxation of ureteral spasm, as well as to incite excessive ureteral persistalsis—and may occasionally be of some benefit—they are methods far inferior in their efficacy and reliability to the procedures of dilatation, which I have been using for the last nine or ten years.

The larger proportion, at least seventy-five per cent. of ureteral calculi, whose small diameter is no larger than three to four eighths of an inch, either pass spontaneously or can be made to pass with one or the other, or a combination of the following methods. These may be enumerated.

The introduction of catheters or bougies with or without the injection of glycerin, oil or antispasmodics; the use of my olivary dilators with or without the simultaneous employment of the d'Arsonval high frequency current; the use of large bougies or large dilating conical ureteral catheters, and finally any one or a combination of these together with the incision of the ureteral orifice by means of a special scissor forceps to permit of the extraction of a calculus too large to be evacuated through the ureteral lip.

Were it not for the numerous examples of the expulsion of a ureteral calculus immediately after or simultaneous with the withdrawal of the dilating ureteral catheters, an attitude of skepticism would find some justification.

OLIVARY DILATORS FOR CALCULI.

A somewhat more delicate series of manipulation can be carried out as suggested by me some eight years ago by the employment of little olives of graduated sizes introduced into the ureter through the operating cystoscope to bring about a more drastic dilatation than is possible by means of catheters alone. Where the ureter has been considerably dilated by reason of the lodgment of a rather large calculus for many months, this method is indicated and attended with gratifying results.

IMPACTED URETERAL CALCULUS.

Where the stone is almost one-half inch in diameter or larger and has been impacted for some time in the intramural portion of the ureter, it may be extricated by cutting the superior lip of the ureteral orifice, when the orifice is evidently too small to permit of its passage. Such a case was the following:

Case I.—S. B., female, aged fifty-two, consulted me on November 8, 1920, with a history of attacks of right renal colic for about eight years, accompanied now and then with chills and fever. Cystoscopy showed a moderate degree of cystitis; the right ureteral mound tumefied; the orifice small, and its appearance suggestive of a stone just behind the orifice. It was possible to introduce a ureteral catheter with considerable difficulty beyond the stone, but unable to dislodge it. X-ray examination confirmed the diagnosis of calculus by the finding of an ellipsoid shadow about three-eighths of an inch by half an inch at a point corresponding to the situation of the stone as diagnosticated at cystoscopy, that is, just above the orifice. On November 12, 1920, the stone was still in the same situation, and the question of operative intervention was considered in view of the fact that the orifice was so small that the passage of such a large stone through it was considered out of the question. However, it was decided to cut the orifice and fulgurate the margin of the incision with a view to stopping the hemorrhage. This was carried out on the 12th of November, when catheterization was found impossible. Immediately after cutting the orifice, the stone was partly visible, although still fairly imbedded in a pocket of mucous membrane, but, due to the irritability of the patient, it was decided to wait until the following day before making further attempts to dislodge it from its bed. This was not necessary, however, since the patient passed the stone spontaneously.

There are other interesting phases of the clinical course of ureteral calculous disease that may be grouped for discussion under the following heads.

Small calculi with symptoms of intestinal obstruction, pseudoperitonitic symptoms, and anuria, large calculi of the ureter and multiple calculi of the ureter.

CALCULUS SIMULATING INTESTINAL OBSTRUCTION AND PERITONITIS.

We are not infrequently called to see patients at their homes, in whom cursory examination might lead us to diagnosticate intestinal obstruction. Where a history of previous lumbar pain has not been obtained, and where the existence of costovertebral tenderness, or pain radiating from the lumbar region into the groin, iliac region or testicle, has not been elicited, particularly when blood in the urine is absent, it has not infrequently occurred that an exploratory laparotomy has been advised.

That such a procedure may be fatal when we are dealing with a case of impacted ureteral calculus producing symptoms of ileus, I have had occasion to observe in a patient who was operated upon in one of our large hospitals. In this case the diagnosis of intestinal obstruction was made, and a laparotomy performed. Nothing was found, but some doubtful adhesions, and the patient succumbed shortly thereafter with uremic symptoms due to suppression of urine, and the autopsy showed a calculus blocking the lower left ureter.

During the last five years I have been able to diagnose seven such cases, in all of which there were symptoms of intestinal obstruction. Let us consider the vagaries in the symptomatology of ureter stone in a discussion of the following case, the clinical course of which, briefly summarized, would read:

Impacted, obstructing ureteral calculus, dilated ureter and renal pelvis, with manifestations now of intestinal obstruction, now of peritonitis, with fever, abdominal distension, rebound tenderness—completely relieved and cured through cystoscopic methods by causing expulsion of the stone.

Case II.—L. S. B., male, presented the following clinical picture: A distended abdomen, constipation, severe pain in the left iliac fossa, rigidity of the left iliac region, distinct rebound tenderness, and by rectal examination a small indefinite mass, high up in a culdesac on the left side.

Cystoscopy, October 4, 1919, demonstrated that there was urinary retention in the left ureter and kidney, for about an ounce of turbid urine, containing some red blood cells, without pus, could be collected in a continuous stream when a catheter was inserted some ten cm. into the ureter, suggesting a calculus low down in the ureter, with dilated ureter and acute hydronephrosis. In spite of the relief that was afforded in this case by the emptying of the kidney, distinct increase of the symptoms occurred on the following day, when the temperature rose to 102 degrees in the afternoon. It was surmised that by virtue of the swelling of the ureter, obstruction had again taken place, so that catheterization of the ureter was again in order. On the following day, October 5th, the tongue was coated, the left side of the abdomen was hard, with boardlike rigidity, the temperature was 103 degrees, and the patient was unable to take food. In short, symptoms suggestive of a combination of intestinal obstruction and possibly peritonitis.

On October 6th, therefore, catherization of the left ureter was done again, and the same phenomena of retention of urine could be demonstrated. So great was this retention that pressure over the kidney and bladder region, as well as over the left iliac fossa, increased the flow through the ureteral catheter. Two ureteral catheters were then inserted into the left ureter up to the kidney, and the cystoscope removed, the catheters being allowed to remain from the time of insertion, 3 p. m. on October 6th, until the next morning, 9:30 a. m.

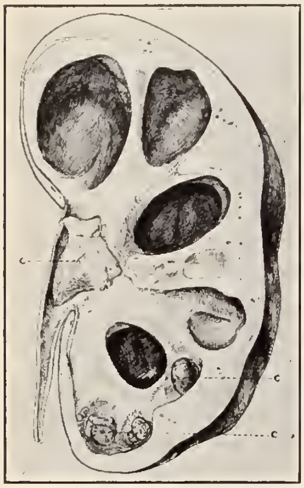

Fig. 1.—Spear or arrowhead type of calculus leading to infection and secondary calculus formation. Cross section of a case of specimen of calculus pyonephrosis with a typical pyramidal stone incarcerated in the pelvis, the extrarenal pelvis being small. Calculus in the lower pole at D and C.

On October 7th the abdomen was distinctly less rigid, the patient's condition considerably improved, the temperature having dropped to 100 degrees. The catheters were then slowly withdrawn simultaneously, and as they were pulled out, it seemed that an obstruction to their exit could be distinctly made out. As they were withdrawn this resistance was seen to be due to the expulsion of a ureteral calculus that was tightly adherent to the two catheters as it was drawn through the ureter, bladder and urethra without being dislodged—a most remarkable and unusual occurrence.

From then on the patient made an uneventful recovery.

URETERAL CALCULUS WITH REFLEX ANURIA.

Although it is well recognized by the urologist that unilateral ureteral obstruction by a stone, particularly by a descending ureteral calculus, may be followed by reflex suppression of urine, the urgency of instituting immediately very simple methods of relief is not universally recognized nor accepted by the internist. Therefore, not only for diagnostic purposes, but for the rapid amelioration or even the complete abatement of symptoms, you should have recourse to cystoscopy and ureteral catheterization, for this you will find is a most reliable and satisfactory means for renewing the activity of the kidneys.

URIC ACID CONCRETIONS AND URETERAL OBTURATIONS.

The services of the urologist and cystoscopist will be found of great value in that interesting group of cases of urinary lithiasis in which uric acid concretions are passed from time to time into the ureteral tract, causing more or less complete obturation by virtue either of the impaction of single concretions, or by reason of complete filling of a portion of the ureteral lumen with débris, concretions and altered blood.

When such a patient is referred to us with the history of lumbar, or obscure abdominal pain radiating into one or the other groin or iliac region, with definite urinary findings, such as the presence of red blood cells, our suspicions as to the true nature of the affection will doubtless be at once aroused. However, many are the cases in which during the period of examination of the urinary specimen, practically no blood cells are detected, and the local symptoms referable to the urinary tract are meagre or practically absent. In such instances we get a history of abdominal pain, and if we do not carefully elicit its exact localization may often miss the fact that the pain had on certain occasions been more severe in the lumbar region, and had at times shown typical evidences of radiation. It is when the ureter becomes completely blocked with débris, concretions and altered blood, that no more excretion from the affected kidney can take place, and then the time arises when negative urinary findings are reported.

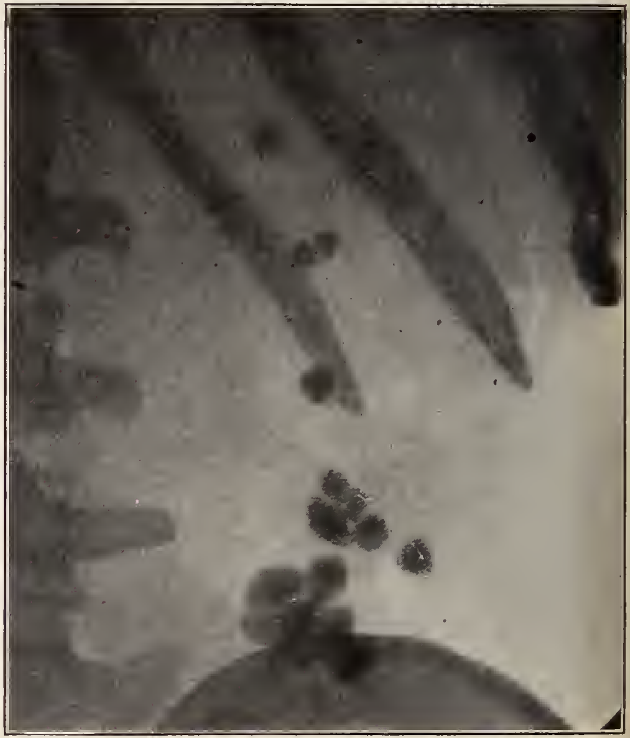

Fig. 2.—Calculi in hydronephrotic kidney dispersed over a large part of the lumbar area.

So, recently I was called in to see a patient, upon whom the diagnosis of ovarian trouble had been made by a local surgeon, and who received the advice to have the ovary and appendix removed. Not satisfied with this diagnosis, it appeared to me that the cystoscope would certainly aid in clarifying the picture, and was not a little gratified when following the insertion of the ureteral catheter, not only a large amount of old retained urine was evacuated from the kidney, but a considerable amount of débris, altered blood, and urinary concretions was collected and caused to be emitted alongside of the catheter into the bladder.

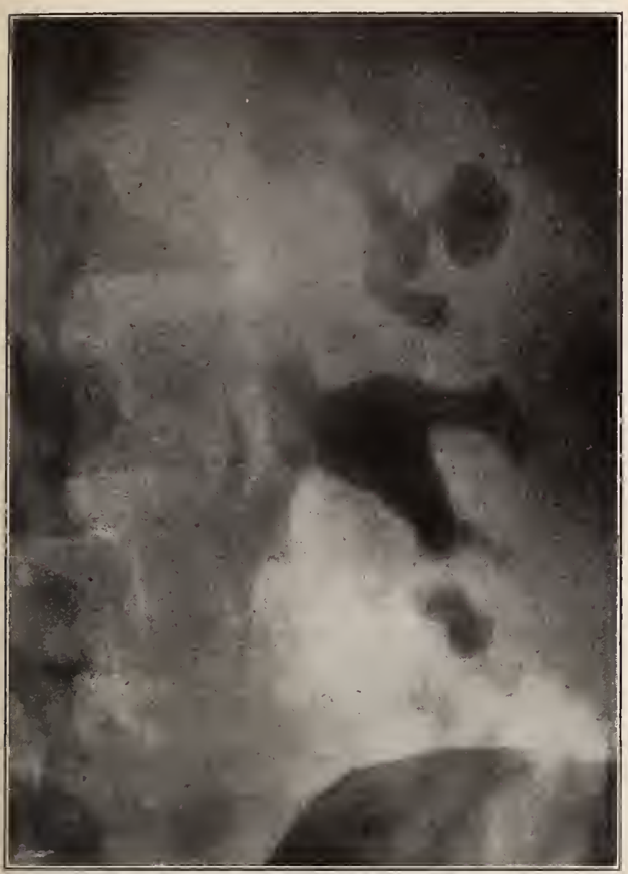

FIG. 3.—Branching calculi in double renal pelvis.

That the amount of the urine retained in the kidney and the ureter, as well as the amorphous material blocking the ureter was out of all proportion with what was collected at one cystoscopy, could be easily demonstrated in this case, when, on a second cystoscopic examination, some two days after the first, the affected ureter was found swollen and gaping. Manipulation with the ureteral catheter was succeeded by the extrusion of a considerably lengthy mass of brownish material in tapelike formation, in a manner simulating that of pus extruded through the ureter from a pyonephrotic kidney. Such masses of introureteral stuffing (if such term may be applied) may be of such firm consistency, that they retain their tapelike form for some time after they have been emitted and propelled by the intravesical current into the *bas fond* of the bladder.

When a ureter and kidney are freed of such material by irrigation through the ureter catheter, or if necessary by the use of the retention ureteral catheter for a period of twenty-four to forty-eight hours, rapid restoration to the normal may be expected.

URETERAL BLOCKAGE.

The experienced urologist not infrequently encounters cases of what may be justly termed aseptic fever in the urinary tract. Such febrile conditions are attributable to retention of urine in the kidney with blockage of some part of the ureteral tract, and may be unaccompanied by any of the usual products of pyogenic infection in either the urine from the ureter or pelvis of the kidney. In such cases I have been able to convince myself after repeated examinations, both with the microscope and by careful cultural methods, of the compatibility of the absence of white blood cells and microorganisms with high temperatures. Let us, therefore, be careful to avoid the error of early operative intervention when a case of high fever with lumbar pain, attended possibly with distinct enlargement of the kidney presents itself to us for advice, and let us not forget that the ureteral catheter may demonstrate merely retention of urine in a kidney due to the passage of a calculus or obturation of the ureter with débris, old blood and concretions. Whether minimal and transitory lesions of pyelonephritis or even embolic infectious foci in the renal parenchyma are present here, I have had no means of determining.

Some eight years ago I had the good fortune to cure a patient, in whom immediate exploratory operation on the kidney had been advised, by the mere introduction of the ureter catheter, the washing out of débris and amorphous material from the ureter, and the draining of the kidney by the ureteral catheter for several hours. The temperature dropped immediately from 104° to normal, and the patient has had no recurrence during all these years.

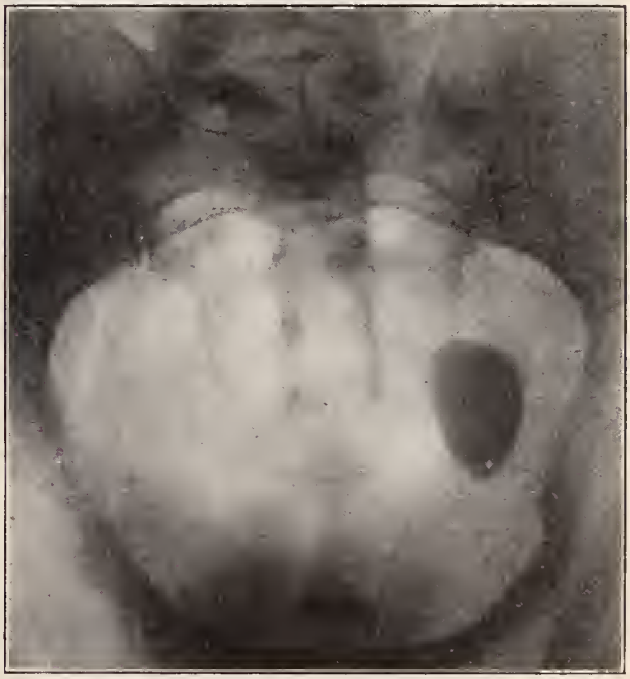

FIG. 4.—Large stone in lower ureter; case treated many years for socalled stomach trouble.

Perhaps it is the medical man more often than the surgeon, who will be consulted by those interesting patients with chronic backache with occasional hematuria, high blood pressure and other evidences of chronic nephritis, in whom the history has never aroused the suspicion of the existence of multiple urinary calculi as a factor in the clinical picture in these cases.

It is in such cases of socalled nephritis where, either because of the composition of the stone or the stoutness of the patient, a satisfactory x ray examination is impossible, that most reliable and gratifying data are available, if we only apply the proper means of investigation, viz., the cystoscope and ureter catheter.

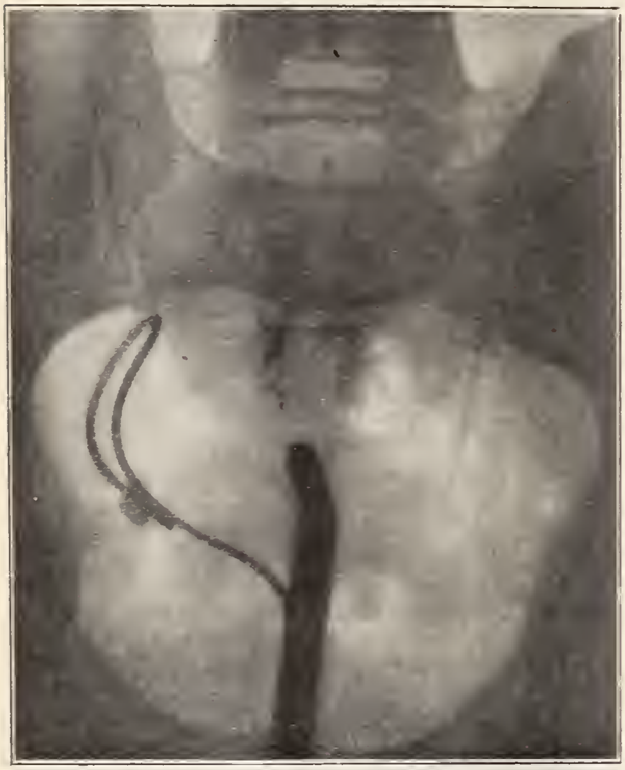

Fig. 5.—Catheter makes a loop in the ureter passing the stone.

Thus, in the case of a male patient (J. S., fifty-five years of age) who had had occasional edema of the legs for some three years, attacks of diminution of the urinary output, and one attack of socalled gravel during which he is said to have passed some sand, a most striking example of how the gravity of the situation can be underestimated was presented to us.

Although refusing cystoscopy at the first consultation, because of the persistence of the hematuria, the patient finally submitted to the examination, on May 17, 1919, when we were able to disclose definite evidences of retention of urine in the right kidney with the presence of some microscopic pus, with urine from the left kidney also containing leucocytes.

A tentative diagnosis of infection of the right kidney pelvis with retention (hydronephrosis), probably bilateral calculous disease, with possibly a stone in the right ureter near the ureteropelvic junction was made.

Some five days later because of a severe attack of renal colic on the other (left) side, cystoscopy was again done and marked retention of urine was demonstrated in the left kidney, about forty-five c. c. of dark brown urine being collected. In the right ureter there was an obstruction at eighteen cm. from the bladder, one that could not be passed and no urine could be collected from the right kidney on this day.

Therefore the patient had evidently passed a calculus or calculi into the right ureter during the interval between the first and second examinations (about a week) with the establishment of complete blockage of the right kidney, and further, had developed retention in the sister organ.

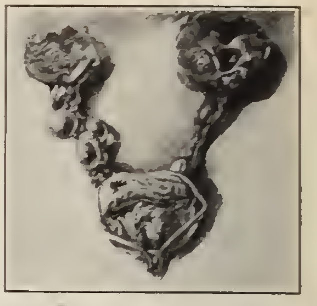

Fig. 6b.—Shows a drawing of he autopsy specimen.

Then uremic symptoms began to make their appearance, and on May 24th suppression of urine occurred, the symptoms of uremia becoming progressively more pronounced.

On the same day the obstruction in the right ureter was again encountered and no urine was obtained, while the obstruction in the left ureter was overcome and again almost two ounces of a dark brown fluid were evacuated from the left ureter. The catheter in the left kidney was allowed to remain *in situ*. Because of the increasing diminution of urinary output, the blockade of the right ureter, since practically no urine was passed from the left kidney for some hours, and since the retention

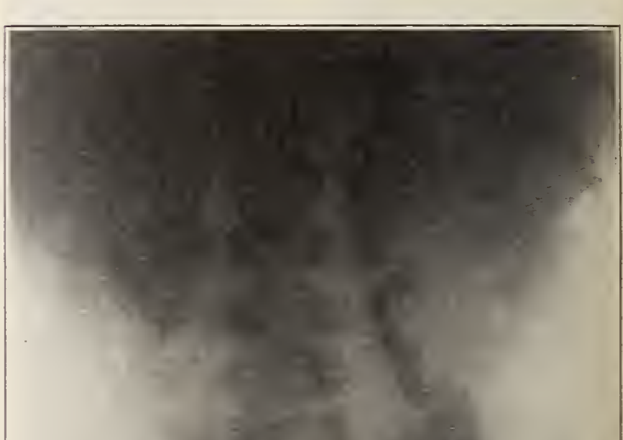

Fig. 6.—Cystogram and ureterogram in congenital hydronephrosis and hydroureter.

catheter had produced merely temporary relief without inciting the right kidney to functionate, it was decided to operate on the right kidney on the next day.

At operation an extremely hard and enlarged right kidney was found, and the right ureter could be felt enormously distended down to a point corresponding to the site of the suspected calculus. Here a calculus was found impacted in the ureter. It was dislodged and removed, the kidney was decapsulated and a tube inserted.

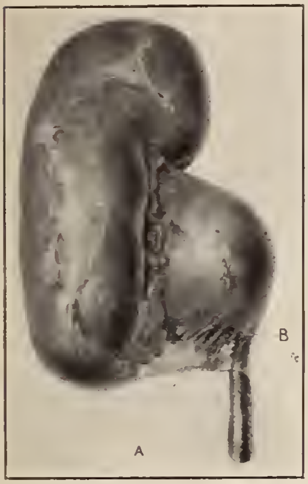

Fig. 7.

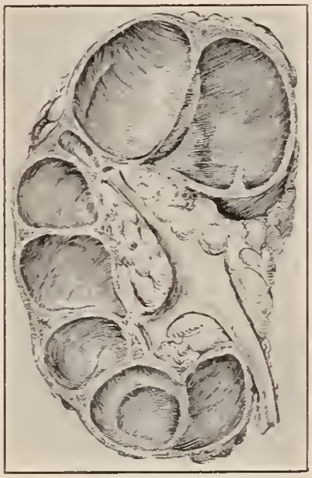

Fig. 8.

Fig. 7.—Congenital type of hydronephrosis in a case of socalled clinical pyelitis. External aspect of infected hydronephrosis of the congenital intermittent type showing the enormously dilated extrarenal pelvis, the stenosis of the ureteropelvic junction and the lesions which cause kinking of the ureter at its junction; adhesions over the outer surface of the kidney. A, stenosed junction; B, adhesions.

Fig. 8.—Drawing of section of tuberculous kidney converted into a sac with compartments filled with cheesy material.

Although temporary improvement occurred, the patient succumbed about a week later with the usual symptoms of uremia.

CONCLUSIONS.

We were evidently dealing here with a case of chronic nephritis, complicated with bilateral calculous disease, in a man whose life might have been prolonged had the diagnosis been made earlier, perhaps years before, through the timely application of the cystoscope.

RENAL LITHIASIS.

Although the importance of the x ray examination of the urinary tract in the diagnosis of ureter and kidney stones is not undervalued by the urologist, the general surgeon who includes operations on the urinary tract in his domain, should learn by following the work of the urologic specialist, that the data obtainable through cystoscopy, as well as the application of the x ray and cystoscope and ureter catheter, are indispensable means for a complete evaluation of the indications for operative procedure. He who would operate upon a kidney or ureter for renal or ureteral stone in the light of our present knowledge, without resorting to the use of the cystoscope for additional information as to the function of the kidney, and as to the existence of an obstruction of the urinary tract, will not only frequently fail to find the calculus for which he searches, but will soon learn that he cannot correctly set the indications for selective operative procedure when he bases his plans for intervention upon the findings of radiography alone.

I shall not dilate upon the identification of suspected shadows within the ureteral path by that well known method of introducing a shadowgraph or opaque catheter, nor shall I discuss in full the value of visualizing the pelvis of the kidney and ureter by the injection of opaque fluids, such as sodium bromide or thorium nitrate for the production of pyelograms or ureterograms; for these methods are well known to all of you. But I shall merely present a number of pictures and let them be accompanied by comments on diagnosis and clinical course that in my opinion may be of some value to those who have not the opportunity of encountering large numbers of cases in this field; for to them these pictures may be of more than passing interest.

If the röntgenologist is able to demonstrate a well defined renal shadow in most of his radiograms, you will be greatly aided in the localization of the suspected stone within the renal area and can often accurately guage its site so that search at the operating table will not be prolonged.

Where we are dealing with a small flat numular stone, situated in the pelvis of the kidney, the indications for intervention will depend greatly upon the symptomatology, the degree of pain and discomfort, the presence and the amount of hematuria, and particularly upon the cystoscopic findings, whether these demonstrate the existence of infection or blockage either of the pelvis or ureteropelvic junction. It is these two factors that play the greatest rôle in determining our attitude towards surgical procedure, and for the elucidation of which the urologic methods of cystoscopy, the application of the shadowgraph catheter, and more rarely a pyelography, are essential.

When we are dealing with a calculus of the pyramidal or spearhead variety, with a beak or apex pointing down and into the ureteropelvic junction, we may feel confident that the time will soon arrive when considerable blockage of the ureteropelvic junction may take place. Such calculi are prone to be associated with infection, and should be removed at the earliest date (Fig. 1).

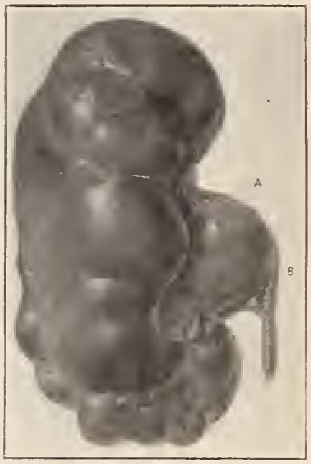

Fig. 9.—External surface of a case of congenital hydronephrosis with marked attenuation of the upper and lower poles, where a membranous wall covers the fluid content; the extrarenal pelvis is pyriform and dilated, the ureter being extremely small, particularly at the ureteropelvic junction, where the abnormal insertion is accentuated by reason of adhesions binding the lower portion of the pelvis to the ureter. A, extrarenal pelvis; B, narrowed junction.

Although it is true that the experienced interpreter of the röntgenogram can foretell much regarding the pathology of a kidney harboring calculi from a careful study of the renal shadow, the size, shape and number of the intrarenal shadows, their change in position, excursions and configuration, much additional information will be forthcoming, if the urologist will insert the opaque catheter for purposes of further localization and diagnosis.

Thus, in (Figs. 2 and 3) the mere consideration of the x ray plate throws much light on the type of kidney present, for in Fig. 2 the multiplicity of the shadows, their wide separation occupying a territory from the iliac crest almost to the eleventh rib, even without a distinct renal outline, proclaims the condition to be one of a hydronephrotic or pyonephrotic kidney of large size with multiple calculi.

So, too, in Fig. 3, the two well separated groups of dendritic or branching calculi representing casts of two distinct pelves, suggest the diagnosis that had been confirmed through cystoscopic means of the existence of two separate pelves filled with branching stones. Identification of other shadows that appear to stimulate calcified glands by reason of size and irregularity is greatly aided by use of the cystoscope and shadowgraph catheter. Such large shadows as depicted in Fig. 4 would produce some hesitation in the mind of the casual interpreter as to whether a calculus in a diverticulum of the bladder, a vesical or ureteral calculus were at hand. It was the cystoscope alone that permitted the exact localization of the enormous ureteral calculus subsequently removed through extraperitoneal ureterotomy.

Not only in the identification of suspected ureteral stone and in the exclusion of certain extraureteral shadows from consideration, is the shadowgraph catheter of value, but also in the localization of shadows within the renal area. A properly inserted shadowgraph catheter frequently gives valuable information regarding the situation of stones within the kidney. In hydronephrosis, when the catheter can be made to enter the kidney proper (and not when it is arrested at the ureteropelvic junction) a wide excursion of the ureter catheter into the flank tells such a complete story of renal enlargement that the diagnosis of hydronephrosis with or without infection can be readily made without resorting to the more dangerous procedure of pyelography.

In cases of multiple ureteral calculi, we are likely to be misled by the shifting of the shadows, by their mesial position, and even cystoscopy, if carried out only once, may reveal normal urine although possibly diluted from one or both ureters. The shadowgraph catheter not infrequently makes either a loop or a complete turn in the ureter, such as in Fig. 5, demonstrating the existence of a hydroureter or a dilated ureter, and the tortuosity of one or the other ureter and its redundancy can infrequently be demonstrated by the wide excursion into the iliac region taken by the opaque catheter. Occasionally in a case of negative or doubtful x ray, a ureterogram will demonstrate ureteral dilatation above an impacted calculus, and give valuable indications for intervention.

Although the visualization of the ureter and pelvis by the injection of opaque fluid is exceedingly valuable at times, its employment should be restricted by reason of certain dangers that always have and will attend such methods. Fortunately in sodium bromide we have a fairly reliable and safe solution, but with the enlargement of our experience there follows *pari passu* a restriction in the sphere of application of pyelography. Its importance in certain cases, however, cannot be denied.

In hypernephroma the pelvis of the kidney may be drawn out and distorted in what is known as the spider form. Occasionally the existence of ureteral stenosis can be demonstrated to our satisfaction as was the case in a patient who had a closed tuberculosis of the kidney with ureteral stenosis.

So also in children with congenital dilatation of the ureters, or with dilatation of the ureters and pelvis of the kidneys due to peripheral urinary obstruction, the filling of the bladder with sodium bromide and placing the child in the Trendelenburg posture, may permit of the filling of the ureters and their graphic demonstration as dilated tortuous channels (Fig. 6) and hydronephrosis.

Not only in adults, but in children, as well as in infants, the development of the modern children's cystoscope has made it possible to diagnosticate with great accuracy, lesions of the bladder and kidney by visual examination, by ureteral catheterization and by the application of pyelography.

It has been my good fortune to be able to determine in a number of cases, and recently again in a little girl two years of age, that the stereotyped diagnosis of pyelitis of children was erroneous, for the cystoscope and ureter catheters gave proof that the right kidney contained considerable pus, and that there was some retention of urine in the renal pelvis. A diagnosis of infected congenital hydronephrosis was made, nephrectomy was done, and a beautiful example of one of the forms of congenital hydronephrosis with a pin-point opening at the ureteropelvis junction (Fig. 7) was obtained at operation. The baby made an uneventful recovery.

So also the diagnosis of tuberculosis can readily be made, and in other cases enormous patent ureteral orifices will at once suggest to us the diagnosis of bilateral or unilateral congenital hydronephrosis and hydroureter, or hydroureter and hydronephrosis dependent upon some obstructive condition in the urethra, or dependent upon some nerve lesion. In such patients the introduction of sodium bromide, or other opaque fluid and the placement of the patient in the Trendelenburg posture will permit of the regurgitation or reflux of solution into the ureters, showing them to be dilated and tortuous.

In my own experience I can say without hesitation that it is in tuberculosis of the kidney that both the internist and surgeon are likely to delay surgical intervention, by reason of dilatory application of cystoscopic methods, and because the majority of such patients are diagnosticated and treated for a long time as cases of cystitis. Whenever an adolescent or middle aged individual gives a history of urinary frequency, particularly of nocturia, without gonorrheal infection, without history of instrumentation, or previous attacks of cystitis, a cystoscopic examination should be advised. Day after day patients are brought to my office, in whom the latter lesions, such as I shall show you here, are found, miliary tubercles with superficial ulcers, characteristic ureteral lesions on the affected side, with tubercles and a contact ulcer over the posterior wall, deep ulcers with total erosion of the ureteral lip, with extensive and marked retraction of the ureteral orifice—and in these nephrectomy will show a kidney in the stage of advanced cheesy degeneration (Fig. 8), pyonephrotic kidneys that have been involved for months and even years, and a multitude of other interesting pathological changes. An important circumstance is the frequent separation of cheesy abscesses from a communication with the renal pelvis by stenosis of a calyx, a process which accounts for the absence of tubercle bacilli and the apparent cure in some cases after the use of vaccines. Other specimens are seen where a portion of the pelvis and kidney which are tuberculous are distinctly segregated from that portion of the pelvis carrying the ureter by a similar stenotic process. In such kidneys tubercle bacilli may be absent for a time, but the lesions about the corresponding ureter will be recognized by the cystoscopist.

RENAL HEMATURIA.

I can but touch upon this most interesting theme. Most important is it, I believe, to submit patients with hematuria to investigation with the cystoscope during an attack of hematuria and not to wait until the hematuria has subsided. How often is much valuable time lost when the urologist is requested to make a diagnosis in the free interval, when neither kidney is bleeding.

When the renal bleeding is unilateral, you should have light as to whether such hematuria is due to stone, to tuberculosis, intrarenal papilloma, angioma, socalled idiopathic or essential hematuria, hypernephroma or carcinoma, or more rarely to hydronephrosis, ureteritis, pyelitis cystica, or to polycystic kidneys.

The diagnosis of hypernephroma will not be difficult to make in the advanced cases, but when we are confronted with a small tumor, which has produced no distortion of the pelvis, or insufficient to be demonstrated by the pyelogram, an exploratory operation with a presumptive diagnosis may have to be resorted to when the unilateral nature of the bleeding has been proven, and recurrences of the bleeding have been sufficient in number to warrant intervention. Socalled idiopathic or essential hematuria responds remarkably in some cases to decapsulation, and I have a number of cases in my records where unilateral and bilateral decapsulation have been rewarded by complete cessation of the hematuria.

Occasionally you will encounter various forms of lesions in congenital types of hydronephrosis with secondary concretions that occasion most alarming hematuria. In a young girl operated upon by me recently the existence of a hydronephrosis could not be definitely determined because of stenosis of the ureteropelvic junction, making the introduction of the ureter catheter into the pelvis impossible, so that the differential diagnosis between tumor and hydronephrosis with calculus could not be made. At exploratory operation a nephrectomy revealed a beautiful specimen of hydronephrosis (Fig. 9).

Of late years it has come to my notice that cases of socalled cystitis cystica where there are multiple minute cysts in the bladder, present a remarkable clinical picture when they are associated with renal infection or with renal bleeding. In such cases it is difficult to determine with positiveness whether a similar cystic lesion of the pelvis and ureter is responsible for the copious bleeding, or whether the concomitant chronic nephritis or a socalled essential hematuria is to be held accountable. During the last three years, I have practised recapsulation in two cases with remarkable success, and in a recent case I not only performed decapsulation, but also curetted thoroughly the pelvis of the kidney through a nephrotomy opening, the sensation transmitted to the manipulating hand being sufficiently accurate to permit me to determine that the rough, gritty interior of the pelvis was converted into a smooth surface by the action of the spoon. My experience with a previous case leads me to believe, however, that although I was able to destroy the cysts in this manner, that the decapsulation of the kidney and not this process of intrapelvic curettage was responsible for the immediate abatement and subsequent cessation of the hematuria, noted some four days after the operation.

Urine Examination as an Index of Renal Disease*

By HAROLD W. JONES, M.D.,
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The ordinary examination of the urine is of less significance as an index of renal disease than it was formerly considered to be. The functional tests are becoming more and more important in the determination of nephritis, active or latent. At times even these tests fail to bring to light existing disease. It is therefore necessary to judge all cases from three points of view: the symptomatology, the urine examination, and the function. An attempt to reach a satisfactory conclusion from one of these is usually futile. Even today it is a too common practice to judge the renal status as good or bad from one examination of urine. Repeated examinations should be made at different intervals during the day and under various conditions. There are several simple functional tests which can be performed with very little inconvenience to the patient or physician which will give helpful information.

Nephritis, as we know, is frequently patchy in distribution. One portion may be diseased and another in a fairly healthy state; also as portions of the kidney function while others are quiescent, it follows that normal urine may be passed even though the structure as a whole is damaged.

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*From the Medical Department of the Jefferson Hospital.

If there exists a patch of nephritis, the remainder of the kidney will be called upon to take up the extra work. Nearly every kidney is capable of extra work by reason of its reserve power. The patch of nephritis may not be extensive enough to cause severe symptoms, and the outlook as to life is good; yet because the diseased portion is continually draining, the urine contains albumin, casts, numerous white blood cells and sometimes red blood cells. The prognosis if judged from the urine alone in these cases would of necessity be guarded, but the other signs and symptoms frequently do not warrant such a conclusion.

The following statistics and cases are chosen to show how deceptive results of urine examination may be. It will be seen that the urinary findings may signify the presence of severe renal damage when the patient is functionally and symptomatically well. And on the other hand, they fail, partially or completely, to demonstrate existing disease even though the patient is in critical condition from seemingly far advanced nephritis.

McLean (1) in the examination of fifty thousand healthy British troops, found albumin in six per cent. and casts in two per cent. P. Ameule (2) reported blood, pus, and casts in the urine of discharged French soldiers weeks after their attack of nephritis, although functionally and symptomatically they were well.

CASES WITH MARKED NEPHRITIS IN WHICH THE URINE IS NEGATIVE OR NEARLY SO.

In our studies in war nephritis, at General Hospital No. 9, many patients who were well from the viewpoint of function and symptomatology showed albumin and casts though one and two years had elapsed since the onset of the disease. The one fatal case in this group had a phthalein output of seven per cent., a blood urea of 396 mg., and a fixation of specific gravity of 1009-1010. Yet the urine was negative except for a low specific gravity in half the specimens examined.

Case I.—J. 4897, male, aged sixty, a lead worker, was admitted complaining of dyspnea of the Cheyne-Stokes type. There were some evidences of pulmonary edema. Throughout his stay the urine was practically negative except that the specific gravity was low, with occasionally a faint trace of albumin and hyaline casts. The functional tests were in keeping with the severity of his symptoms. His blood nitrogen was increased, the phthalein output was thirty-five per cent., and the two hour collection showed a marked fixation of specific gravity. Several weeks later he insisted on going home. His symptoms were less acute, but the phthalein was decreased and creatinine in the blood increased. On discharge his urine was still negative. In the course of several weeks he was readmitted. He was acutely ill and died within a week after admission. The examination of the urine still failed to give evidence of the severity of his condition.

Case II.—J. 3478, male, aged forty-six, had a severe grade of nephritis with acute uremia, which rapidly proved fatal. His phthalein test showed an output of twenty per cent., the blood nitrogen was increased and the specific gravity was fixed at 1010 and 1011. Yet in the twenty urine examinations fifteen of them were practically negative, except for the low specific gravity.

CASES CLINICALLY WELL WITH URINE STILL SHOWING SIGNS OF DISEASE.

Another patient who was seen recently is C. B., aged thirty-six. Three months after discharge he was working daily and feeling very well, but the urine showed a trace of albumin, casts and few red blood cells.

Case III.—5016, male, aged forty-eight, had an acute exacerbation of a chronic nephritis, following acute tonsillitis. Throughout the course albumin, casts and red blood cells were present. Three months later when he was back at work and feeling finely the urine still showed the same signs.

Case IV.—J. 4780, male, aged forty-seven, had an acute exacerbation of a chronic nephritis. On admission the urine was negative, while the next day it showed a cloud of albumin and a few casts. The phthalein output was thirty-five per cent. and the blood nitrogen increased. On discharge his edema and dyspnea were gone, the blood nitrogen normal and the phthalein forty-five per cent., but the urine still showed albumin and casts.

Case V.—J. 3869, female, aged thirteen, had an acute exacerbation of a chronic nephritis. On discharge, although the phthalein output was fifty per cent., blood nitrogen normal and her headache and dyspnea gone, the urine still showed cloud of albumin and many granular and hyaline casts.

SPECIFIC GRAVITY.

The estimation of the specific gravity is one of the most, if not the most, important part in urine examination. In the cases just outlined, and in many more, the only reliable urinary finding, in the face of severe renal symptoms, is a low specific gravity. A urine with many casts and much albumin but normal specific gravity may be of less significance than one with continual low specific gravity, but few, if any, other abnormal findings.

The presence of casts and albumin in the urine is evidence that structural damage is present in the kidney. It is probably the earliest sign of renal disease and is a simple method of determining the presence of such disease. Therefore it is a valuable test. It is not the purpose of this paper to discredit the examination in itself, but to warn against the judgment of a renal case by single examination, and to show that as an index of the renal status, urine examinations are misleading. Positive urinary findings should serve as a signal for further examination into the renal condition.

FUNCTIONAL TESTS.

Lack of time on the part of the physician and loss of time to the patient is no longer sufficient excuse to prevent the performance of functional tests. The phthalein test can be carried out in the evening or before going to business and the patient go to work, voiding at the stated intervals. The two hour fixation specific gravity test may also be performed at home or at business. The normal diet is satisfactory; place the fluid intake at fifteen to eighteen hundred c. c. and give the patient marked bottles. Another simple test (3) is the comparison of the volume ratio of night and day urine. The total volume for day is collected from eight a. m. until eight p. m. and for night from eight p. m. until eight a. m. No food or fluid is taken during the night period. The normal ratio is day, three to four times as great as night.

In renal cases the night volume may be equal or greater than the day. These three functional tests in the majority of cases will give a fairly accurate idea of the functional capacity of the kidney.

SUMMARY.

1. The ordinary urine examination may lead to erroneous conclusions regarding renal conditions.
2. Many cases of nephritis although functionally and symptomatically improved may show casts and albumin months after discharge from the hospital.
3. Many patients with severe grades of nephritis pass urine that at intervals is negative or nearly so.
4. A urine of continued low specific gravity is of more importance than one of high specific gravity, even though other urinary signs of disease are present.
5. The presence of abnormal urinary findings should serve as a signal for further investigation of the renal status.
6. The two hour fixation specific gravity test, the phthalein and the estimation of the volume ratio of day and night urine are simple functional tests that can be performed with little inconvenience to the physician or the patient.
7. In order to gain a satisfactory estimate of renal disease one must carefully consider the results of urine examinations, those obtained from the performance of functional tests and the symptoms and signs presented by the patient.

REFERENCES.

1. McLean, H.: Medical Research Committee, *Special Reprint Series* 43, London, 1919.
2. Mosenthal, H. O. (after Ameuelle, P.): *Journal Urology*, vol. ii, No. 2, 1918.
3. Jones, H. W.: Ratio of Day to Night Urine, *Journal A. M. A.*, vol. lxxviii, No 7, p. 477.

1805 Pine Street.

The Importance of Roentgen Examination in the Early Diagnosis of Renal Calculus

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The value of the x ray as an aid in diagnosis of many common but indefinite conditions is not sufficiently recognized by the general practitioner. The public is becoming educated to the use of modern methods in medicine as in business and the physician should call to his aid every possible resource which will increase the acuteness and accuracy of the senses. This is particularly true in making a diagnosis of renal calculus. Frequently the symptoms are vague and indefinite even when a calculus of large size is present. It seems almost inexcusable that these cases are allowed to go without radiographic study until the stone has reached so large a size that it, together with the accompanying infection, has practically destroyed the entire kidney. Every patient showing indefinite abdominal symptoms extending over a long period should have the benefit of röntgen study before the condition has a chance to become so far advanced that removal of the kidney is the only procedure left.

A careful history is important in all obscure abdominal conditions. This should include not only recent disturbances but careful examination for symptoms which may have been present years ago. Every calculus must begin as a small affair and we frequently have symptoms which, if not definite, will at least direct our minds in the proper channels. These symptoms usually occur when the stone is small and long before the patient consults the physician for the indefinite symptoms of later stages. In the majority of cases the occurrence of one or more attacks of renal colic will attract the attention, and even if they have occurred years before are very important.

In a typical case the pain is intense with collapse, feeble rapid pulse and cold clammy skin. The pain is paroxysmal in character beginning in the back and radiating down the ureter to the testes, labia or thighs. The attack may pass off in a few hours or last several days. There is frequency of micturition and the urine contains blood which at times can only be discovered by the microscope. In some cases these symptoms may be so slight as not to incapacitate the patient, but the history of their occurrence is important. In cases of slight renal colic, or in cases in which there is no colic at all, the symptoms are referred to other organs. Many of these patients are treated for floating kidney, cystitis, gallstones, chronic rheumatism, lumbago, intercostal neuralgia, dyspepsia and uterine diseases. It is in these latter conditions which do not respond to appropriate treatment that the aid of the x ray should be sought. Since the more constant use of the x ray in indefinite cases of dyspepsia many cases of renal calculus are being discovered accidently in the routine gastro-intestinal examination.

The indefinite symptoms which may be present and which should excite our interest are:

1. *Pain* may be of a mild, but continuous character. At times it may be only a dull aching or sensation of weight. Exertion or sudden moving may frequently bring it to the patient's notice. Such in-

definite pain may have extended over a period of years, being more noticeable at some times than at others. It may be definitely localized or may be referred to any organ in the abdomen. By palpation we may obtain tenderness in the back or directly over the kidney. Such indefinite symptoms may lead the physician to believe he is dealing with some other abdominal condition, but the possibility of calculus should always be borne in mind.

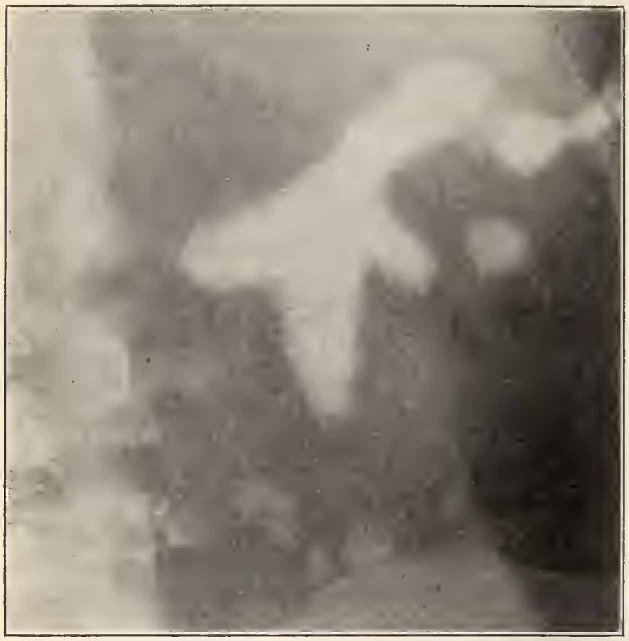

Fig. 1.—Case I.

2. *Bladder disturbances* are frequently the only symptom of calculus. This takes the form of a mild cystitis, with periods of frequency, urgency and burning. The urine shows slight traces of albumin due to blood or a small amount of pus. When these symptoms continue over a long period, particularly if associated with indefinite pain or soreness in the abdomen or back, a complete examination of the genitourinary tract should be made. The distress of lumbago, at times persistent and at others intermittent, which resists the ordinary treatment, should direct our attention to the possibility of calculus.

3. *The symptoms of gallstones* frequently resemble those of urinary calculus and vice versa. In the absence of jaundice the possibility of urinary calculus should always be thought of and appropriate x ray study made.

4. The symptoms of chronic rheumatism, that all embracing disease, frequently have their origin in an undiscovered and unthought of urinary calculus.

5. *The digestive disturbances* due to calculus may simulate almost any disease. A careful watch should be kept in all gastrointestinal x ray studies to detect the possible presence of a stone. Frequently stones are thus discovered which may be the cause of the condition, or on the other hand, may have had no relation to it at all. Every case of suspected stone or indefinite abdominal symptoms should therefore receive at the earliest possible time a complete x ray examination.

Calculi differ in the intensity of the shadow which they cast, but in every case, except in the very fat patient, we expect to show evidence of stone. Calcium oxalate casts the darkest shadow, urate comes next, while phosphate gives the least shadow. Pure uric acid will not cast a shadow. As a rule you will find this calculi partaking of the makeup of two or more elements, so the percentage of failure to demonstrate calculi is slight.

Preliminary preparation before x raying the kidneys is important. The patient should receive an active purge such as castor oil the night before, followed the next morning by two or more high enemas. This will remove the intestinal contents and especially gas which shows clearly on the plate. The patient should be fasting from the day before. All clothes must be removed and a tube of medium penetration used, so we can get the proper differentiation of the organs. A good plate will show the outline of the kidney itself. The patient is placed upon the back and firm compression made, with a medium diaphragm, over the abdomen. If the patient can be placed in the Trendelenburg position it will materially add to the clearness of the plate, as in this way the intestines are displaced out of the way. To prevent movement the patient should hold the breath during the exposure. Plates must be made of both kidneys as the pain may be referred to the opposite side. Plates are also made of the ureters and the bladder.

The recent introduction of the Potter-Bucky diaphragm has been a great help in x ray examinations for calculus. This apparatus cuts out the secondary rays which have a tendency to fog the plate and thus obscure the image. We are thus able to get much clearer outlines. One large film is used between two intensifying screens and we thus obtain both kidneys, ureters and bladder on the one plate. The outline of both kidneys is usually quite clear and comparison of the two kidneys can be made. Many stones of slight density are brought out and the accurate position of both kidneys obtained. This technic has been a great advance in this work.

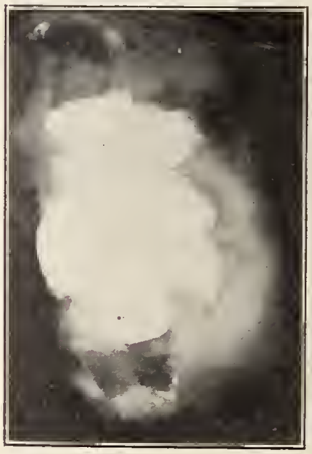

Fig. 2.—Case IV.

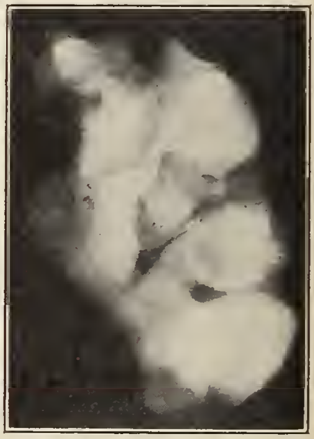

Fig. 3.—Case V.

There are certain conditions which may be mistaken for calculus and which we must be careful to rule out. Gas in the intestines, or hard fecal masses may be misleading, but this is usually eliminated by careful preparation of the patient. Again, calcareous mesenteric glands or phleboliths may simulate calculus shadows. This can sometimes only be eliminated by taking plates before and after passing a metallic urethral catheter or by injecting the ureters and kidney pelvis with a dense metallic solution such as argyrol. Concretions in the appendix have sometimes been mistaken for stone. The importance of this subject has been brought to my attention by a series of recent cases in which x ray diagnosis of calculus had been made only after the kidney had been so badly damaged that nothing short of radical removal would be of benefit. These patients had been subjected to a dangerous operation, usually at an age when they were least able to stand it, and an additional burden was thrown upon the remaining kidney at a time when degenerative changes were beginning and when compensatory action of the remaining kidney was not easily obtained. If these patients had been x rayed early and the calculus discovered when it was small, nephrotomy with removal of the calculus would have saved the patient's kidney and relieved them of the hazard of maintaining proper elimination with one less kidney than nature intended. In addition to the calculus itself they have had to contend with the accompanying septic infection with absorption of toxins and its consequent anemia and ill health, and possible focus of infection for numerous other ailments. The general practitioner on whom this responsibility rests should keep prominently in mind the possibility of calculus and not hesitate to avail himself of the aid offered by röntgen examination in these obscure abdominal conditions. In this way life would be prolonged, indefinite symptoms relieved, and the consequent septic focus removed.

The following case histories with x ray findings serve to illustrate this unfortunate class of cases:

CASE I.—Mrs. B. K., aged forty-eight, was taken ill a few days before admission with sudden severe pain in lumbar region. Since this attack the urine had had a milky color with marked burning during micturition. Patient had urgency and frequency of urination. The patient had been well except for ovarian trouble twenty-one years ago, for which she was operated upon. For a year or more the patient had had a dull ache in the lumbar region. During the last few weeks this had extended down the left thigh. The patient was poorly nourished. Lungs showed flat type chest, expansion poor, percussion showed dullness in left axilla, auscultation showed a few fine crackling râles over the whole chest. The abdomen examination showed no masses. Lower poles of kidneys were palpable and tender.

X ray examination showed the left kidney much enlarged. The pelvis and calices were filled by a large dendritic calculus. Along the outer margin were several smaller calculi and in the lower pole of kidney were several small calculi. Nephrectomy was done and patient discharged convalescing.

CASE II.—Mrs. A. R., aged thirty-two, was admitted complaining of pain over lumbar region posteriorly and over the stomach. Present illness began with chills and fever and general malaise, which became gradually worse. The patient had had the usual diseases of childhood, including typhoid fever. A history of pain over the right lumbar region radiating down to the groin and coming on occasionally for several years was given.

X ray examination showed a large triangular calculus in pelvis of right kidney. Nephrotomy was done and patient was discharged convalescing.

CASE III.—F. B., aged thirty-nine, admitted to hospital with pain in centre of abdomen and difficulty in breathing. No past illness except influenza. Patient had had attack of pain in the abdomen occasionally for a year. Also had several attacks of bladder trouble which lasted several months at a time. For the last year had been losing weight and was always tired out. Physical examination showed marked emaciation.

X ray examination showed a large calculus in the pelvis of the right kidney with numerous small calculi in the calices. The kidney shadow was much enlarged. An anterior incision was made and large cystic kidney was brought into view. The patient collapsed and incision closed immediately. Six weeks later the patient was in good condition and was again taken into operating room and a right nephrectomy done; patient discharged convalescing.

CASE IV.—A. M., aged forty-five. Admitted to hospital complaining of chills, fever, loss of weight and obscure abdominal pain. Condition had been coming on gradually for several months with increasing malaise and occasionally attacks of chills and fever. Had had a dull ache in abdomen for years which at times would disappear. Never had had acute renal colic and little bladder disturbance. Physical examination showed marked emaciation, abdomen tender on right side but no mass felt.

X ray examination showed a large dendritic calculus of the pelvis of right kidney. Nephrectomy was done and patient discharged convalescing.

CASE V.—Mrs. A. L., aged forty-three. Admitted complaining of frequency and burning on urinating, pain in the abdomen and chronic indigestion. Patient had suffered for years from indigestion which occasionally was associated with attacks of pain in the abdomen and back. Urinary symptoms began about two years ago and are gradually getting worse. Physical examination showed nothing abnormal except some tenderness on the right side.

X ray examination showed a large shadow in the pelvis of the right kidney.

A nephrectomy of right kidney showed a large dendritic calculus; patient discharged convalescing.

CONCLUSIONS.

1. There are many cases of obscure abdominal conditions without localized symptoms, in which a diagnosis cannot be made by ordinary methods.

2. In the early history of these patients there is often something to direct attention to the kidneys.

3. At the present time with proper apparatus, experience, and not too fat a subject, it is possible to detect renal calculus in the majority of cases by means of the x ray.

4. Early use of the x ray will make the diagnosis and save subsequent destruction of the kidney.

5. The responsibility for this course rests largely with the general practitioner, and the plea is made that these cases be given the advantage of thorough examination including the x ray, so that proper treatment may be instituted early and serious damage to the kidneys avoided.

Some Observations on Contracture of the Neck of the Bladder*

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This interesting and somewhat perplexing clinical entity appearing in literature under a great variety of names presents a great many unsolved problems. Prostatisme sans prostate, fibrous prostate, and contracture of the neck of the bladder, and perhaps atrophy of the prostate, are some of the many names applied to this condition which presents itself to the clinician as a contracted outlet of the urinary bladder with typical obstruction to the emptying of this organ. There are still many moot points connected with the pathogenesis, diagnosis and treatment, and it is hoped that these brief remarks will throw some light on this condition and at the same time start an instructive discussion.

It is interesting to examine these patients through the open bladder and to see how regularly the same picture of a contracted neck or a contracted orifice of the bladder is presented. Despite this regular picture, the microscopic examination of specimens removed from the circumference of this outlet shows quite a variety of microscopic pictures which have been fully described by numerous authors. In view of the fact that many of these patients come for relief only years after the commencement of their disease, it is easy to understand why the initial lesion is so difficult to determine. In Chetwood's interesting case, reported before the section in genitourinary diseases of the American Medical Association, in 1912 (1), a complete postmortem examination of the whole sphincteric orifice and the prostatic urethra was made. In this particular case, there apparently had been chronic productive inflammation which was accompanied by infiltration to a considerable distance involving the tissues from the sphincter muscle down to the glands. There was added, as is usual, a mild suppurative process, which is probably a secondary invasion following the older fibrosis of the neck of the bladder. In addition to this narrowing of the outlet by a circular contracture, there are occasionally encountered small globular fibromata which presumably are part of the general fibrotic change. Many of these cases exist or develop as pure contractures unassociated with any hypertrophy or adenoma formation in the prostate; and those cases associated with adenoma of the prostate, where a bar seems to be developed across the neck of the bladder by the growth of the adenoma, are not under discussion at present. These cases, in my experience, occur in older patients and can readily be distinguished by cystourethroscopy. The cases of contracture of the neck that I have seen almost always occurred in young males who frequently recognized their disability when they realized that they were not able to empty their bladders as expeditiously as their fellows. Some of these cases, it seems to me, date back to early life and are similar to cases reported by Bransford Lewis (2) (Cases I, II and IV). About the same time that Bransford Lewis published his series of cases of prostatic obstruction of obscure type, I brought together a series of cases, some of which surely belong to this particular group. In 1915 I published observations on eleven cases of chronic retention of urine in young boys (3). A number of these cases were explicable on the basis of mechanical obstruction to the outflow of urine from the bladder, such as strictures of the urethra, small meatus and tight prepuce; others were due to intravesical conditions, such as diverticula of the bladder; others, again, seemed due to a neural disturbance either in the brain or the spinal cord. In addition, however, to these fairly clear cases, there was a group of some seven cases in which no evidence of mechanical or neural disturbance could be made out and which were interpreted as due to a relative disharmony between the sphincteric muscle and the detrusor muscle of the bladder.

These cases usually present a picture which we see in contracture of the neck of the bladder in older patients, but owing to the fact that they are usually very young, it is impossible to urethroscope the patients and determine the presence of what seems to me to be a rather typical picture of a contracture of the neck of the bladder. All these patients referred to, just as in those cases of contracture of the neck in adults, allowed easy introduction of instruments into the bladder without encountering any obstruction. They reminded me of cases of spasm at the lower end of the esophagus, socalled cardiospasm, in which the lower end of the esophagus is contracted and the esophagus above is enormously dilated; instruments properly guided will pass through the cardiospastic area without the surgeon's feeling any obstruction, just as instruments are introduced into the bladder in contracture of the neck of the bladder without the surgeon's recognizing any obstruction. In the paper referred to (3), I called attention to the possibility of some of these peculiar youthful cases developing into the adult type of contracture of the neck of the bladder. As far as my study of these infantile cases goes, they develop just as the adult cases do, marked trabeculations of the bladder with formation of pouches of various sizes (diverticula), secondary dilatation of the ureters and hydronephrosis. When infection is added, many of these cases end fatally, but when a case can be carried along to the age when urethroscopy can be performed, one finds that the picture presented at the neck of the bladder and the posterior urethra is identical with that seen in adult cases of contracture of the neck of the bladder. In one case of this sort that was carried along with dilatations of the neck for a number of years, operation through the bladder disclosed what urethroscopy had helped us in diagnosing; a fibrotic contracture which reduced the orifice of the bladder to a minute opening. In looking over my cases of contracture of the neck in adults, I have been impressed with the fact that many of these patients stated that their trouble started in early life, just as was reported in the cases of Bransford Lewis mentioned above. It, therefore, seems to me that in all these cases we should search carefully the previous history of the patient so that we can determine whether the process started in infancy or not, as this may eventually help to clarify the pathogenesis.

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*Read at a meeting of the Section in Genitourinary Surgery, New York Academy of Medicine, January 18, 1922.

In the literature of this subject, considerable space has been given to the question of primary atony of the bladder without obstruction. Whether this really exists without a disease of the nervous system, it is difficult to state definitely at the present time because many of the cases so classified have not had the benefit of a complete exhaustive study and of the Wassermann test. It is strange how frequently a mild contracture of the bladder with residual urine would suggest the diagnosis of atony of the bladder musculature, which diagnosis on further study might be overthrown when the urethroscopic picture suggested the proper interpretation. Other cases in which no definite nerve involvement is demonstrable, masquerading as atony of the bladder, also clear up when the spinal fluid or blood for a Wassermann test proves positive; still, every once in a while one sees a case in which instead of the usual hypertrophy of the bladder muscle behind the contracted neck of the bladder, the bladder wall is thinned out as if the muscle had undergone extensive atrophy. Whether these rare cases associated with a contracted neck of the bladder are due to an inherent weakness in the bladder muscle behind a contracted outlet, or whether they are due to some peripheral neural disturbance, has not been clear to me.

DIAGNOSIS.

For a number of years cases of contracture of the neck of the bladder have been published more and more frequently, but even at this time the clinical entity is not fully appreciated by the average physician or surgeon. The diagnosis of contracture of the neck of the bladder is suggested by the youth of the patient in whom the residual urine is found and when the rectal examination shows a small prostate. This suspicion is verified by the cystourethroscopic examination which I believe shows a rather typical picture. The floor of the supramontane urethra (that is, the prostatic urethra between the bladder cavity and the verumontanum), shows directly above the verumontanum a relative falling away (cavity) to be immediately followed by a more or less thick raised bar which forms the inferior circumference to the fibrotic neck. In the typical uncomplicated case there is no lateral lobe enlargement, and this picture just described, together with the presence of residual urine, makes the diagnosis contracture of the neck which has been regularly disclosed by suprapubic exposure. In my experience, lateral sphincteric obstruction has been rare.

TREATMENT.

In the treatment of this condition many difficulties are presented, because almost everybody who has written on the subject has obtained satisfactory results with a particular type of treatment that he has advocated and possibly originated. Thus, we have cures reported with simple dilatation of the neck through the urethra, with the cold punch operation by Young, with the hot punch operation by Caulk, with the perineal cautery section of the neck by Chetwood, with the wide excision of the neck by Buerger, with the high frequency cauterization by Bugbee—to give only a few of the methods which have been advocated. It is apparent to anyone who sees these cases that no treatment produces anything like one hundred per cent. cures. In prostatic hypertrophy it was originally thought that the Bottini procedure was curative. A later study of these cases, however, showed that the Bottini operation was far from satisfactory; and so it is with many of the procedures that we are now using in contracture of the neck of the bladder. Personally, I have regularly advocated suprapubic approach, as no matter how carefully urethroscopy is performed in these patients, one not infrequently finds other conditions either secondary to or complicating contracture of the neck of the bladder, whose persence had not been suspected. One is influenced, therefore, by what is found on exposing the neck of the bladder, as to the procedure to be followed. Formerly I attempted with the Paquelin cautery to excise the posterior circumference of the sphincter well into the prostatic tissue. This cautery wedge excision apparently led to recontraction and reformation of an obstruction. Subsequently I attempted a broad excision with the scissors of the posterior circumference of the neck of the bladder well into the prostatic tissue, and on the whole have been much pleased with the relief given my patients. That all of the cases with these wide excisions are not definitely cured, I called to your attention last year when I presented a case in which operation had been performed in November, 1915, in this way, the patient years afterward developing a recontracture of the neck which had to be excised for the second time.

On reexamination of some of the patients in whom this wide excision of the posterior circumference of the neck of the bladder had been done, it is surprising to see how slight a groove has resulted at the point of excision but still the patients are able to empty their bladders almost completely. At the time of excision of the posterior circumference of the neck of the bladder, the finger should be introduced and forced through the narrow sphincter margin well into the prostatic urethra so that one can grasp firmly the posterior lip of the stretched sphincter prior to excision. After the excision has been completed, the finger should again be introduced into the posterior urethra, because experience has shown that there is often further down in the posterior urethra another band of fibrous tissue which must be thoroughly sectioned if one wishes to get permanent relief. To control bleeding after these wide excisions, it may be necessary to pass a mattress stitch into the mucous membrane of the bladder grasping that of the posterior urethra on either side of the incision. Hemorrhage, strange to say, is at times a very troublesome feature following either intraurethral punch operation, high frequency cauterization, or suprapubic excision; and in those cases, in which excision is made, it may even be necessary to place a packing tightly in the posterior urethra. Though this method of treatment by suprapubic excision has given me better results than other procedures, I can well recall a number of cases in which the only operative procedure pursued by me was a wide dilatation of the neck of the bladder with my finger which was introduced well up to the second joint and which was followed by complete relief. It also seemed to me that even in the absence of a positive Wassermann, some of these patients were benefitted by the use of small doses of iodide of potassium, and all the cases in which only a dilatation was done, the patients were regularly placed on iodide of potassium with satisfactory results.

SUMMARY.

1. Contracture of the neck of the bladder may start in early childhood and present symptoms that demand recognition only when the patient has reached manhood.

2. The urethroscopic diagnosis in uncomplicated cases is readily made from the characteristic urethral picture described above.

3. No one method of treatment seems to be regularly curative. Excision of the posterior lip through the whole sphincter into the prostatic tissue with section of any secondary fibrous bands in the prostatic urethra, has given me fairly satisfactory results.

REFERENCES.

1. CHETWOOD, C. H.: *Journal A. M. A.*, 1912, p. 275.
2. LEWIS, BRANSFORD: *Annals of Surgery*, March, 1915.
3. BEER, EDWIN: Chronic Retention of Urine in Children, *Journal A. M. A.*, November, 1915.

11 EAST FORTY-EIGHTH STREET.

Worthwhile Tests of Kidney Function

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Accurate diagnosis, valuable prognosis, and intelligent management of the different disturbances of the kidney have necessitated a development of tests to determine, more or less accurately, the exact functional condition of the renal structures. To meet this necessity, investigators have proposed many kidney function tests, of various kinds and of different values. From all of these tests, internists have found it necessary to select some three or four which give the greatest amount of information. In addition to the usual examinations of the urine for albumin and casts, we have found, after considerable experimentation, that the three most valuable tests for kidney function are: 1, the phenolsulphonephthalein; 2, the two hour test, with the measuring of the intake and output of fluids, salt, and nitrogen; and, 3, chemical analysis of the blood.

TWO HOUR TEST (CASE I)

(*Mosenthal Diet*)

	First Month		*Eighth Month*	
	Sp. gravity	*Amount*	*Sp. gravity*	*Amount*
8-10 a. m.	1.024	110 c.c.	1.021	80 c.c.
10-12 n.	1.016	75 c.c.	1.019	95 c.c.
12- 2 p. m.	1.027	100 c.c.	1.017	105 c.c.
2- 4 p. m.	1.019	85 c.c.	1.023	50 c.c.
4- 6 p. m.	1.018	60 c.c.	1.021	40 c.c.
6- 8 p. m.	1.017	75 c.c.	1.020	90 c.c.
8 p. m.-8 a. m.	1.028	375 c.c.	1.022	675 c.c.
	Day urine	505 c.c.	Day urine	460 c.c.
	Night urine	375 c.c.	Night urine	675 c.c.

	Salt Gms.	*Nitrogen Gms.*	*Water C.c.*	*Salt Gms.*	*Nitrogen Gms.*	*Water C.c.*
Intake	5.2	8.4	1250	6.7	8.9	1075
Output	3.0	7.9	1025	2.1	8.0	1135
	2.2	.5	225	4.6	.9	55

TWO HOUR TEST (CASE II)

(*Mosenthal Diet*)

	First week		*Tenth week*	
	Sp. gravity	*Amount*	*Sp. gravity*	*Amount*
8-10 a. m.	1.013	125 c.c.	1.011	125 c.c.
10-12 n.	1.011	125 c.c.	1.011	175 c.c.
12- 2 p. m.	1.014	100 c.c.	1.011	125 c.c.
2- 4 p. m.	1.012	75 c.c.	1.011	100 c.c.
4- 6 p. m.	1.011	75 c.c.	1.011	100 c.c.
6- 8 p. m.	1.013	125 c.c.	1.011	150 c.c.
8 p. m.-8 a. m.	1.014	625 c.c.	1.011	700 c.c.
	Day urine	625 c.c.	Day urine	775 c.c.
	Night urine	625 c.c.	Night urine	700 c.c.

	Salt Gms.	*Nitrogen Gms.*	*Water C.c.*	*Salt Gms.*	*Nitrogen Gms.*	*Water C.c.*
Intake	9.8	9.0	1310	10.5	8.2	1460
Output	9.1	5.4	1250	8.8	3.1	1475
	.7	3.6	60	1.7	5.1	15

The phenolsulphonephthalein test is the easiest to perform and yields considerable information. An output of less than fifty per cent. of this dye in two hours, following the intramuscular injection of exactly one c.c. of this dye and the drinking of two glasses of water by the patient, usually signifies disturbance of function of the kidneys. The lower the percentage excreted, the more pronounced is the inefficiency of the kidney. This test is of more value than any other of the dye tests, and its value increases when it is performed simultaneously with the two hour test and the chemical examination of the blood. It is advisable to use zinc acetate to precipitate any bile or blood which the urine may contain before comparisons are made with the standard solution of the dye.

TWO HOUR TEST (CASE III)

(*Mosenthal Diet*)

	Second week		*Fifteenth week*	
	Sp. gravity	*Amount*	*Sp. gravity*	*Amount*
8-10 a. m.	1.022	75 c.c.	1.016	175 c.c.
10-12 n.	1.019	50 c.c.	1.022	100 c.c.
12- 2 p. m.	1.020	100 c.c.	1.017	125 c.c.
2- 4 p. m.	1.021	75 c.c.	1.016	100 c.c.
4- 6 p. m.	1.020	75 c.c.	1.023	75 c.c.
6- 8 p. m.	1.022	125 c.c.	1.015	150 c.c.
8 p. m.-8 a. m.	1.022	625 c.c.	1.023	375 c.c.
	Day urine	500 c.c.	Day urine	775 c.c.
	Night urine	625 c.c.	Night urine	375 c.c.

	Salt Gms.	*Nitrogen Gms.*	*Water C.c.*	*Salt Gms.*	*Nitrogen Gms.*	*Water C.c.*
Intake	7.6	9.2	1520	8.5	11.3	1200
Output	3.1	3.9	1125	7.9	10.	1100
	4.5	5.3	395	.6	1.3	100

The two hour test, which includes the determination of the amount of intake and output of all fluids, salt, and nitrogen, with the patient upon a diet which is high in salt, and in protein, is valuable. This test has several features which yield considerable information: First, in reference to specific gravity. Normally, the variation in specific gravity of the different specimens of urine, which are collected at two hour intervals during the day and once during the night, from the highest to the lowest figures, should be nine points or more. In inefficiency of the kidneys, there is an early tendency to fixation of specific gravity. The more severe the nephritis, the more pronounced is the fixation of specific gravity. In chronic nephritis without edema, in diabetes insipidus, extreme anemia, cystitis, pyelitis, polycystic kidneys, in the stage of elimination of edema, paralysis of the bladder, urethral stricture, prostatic hypertrophy, etc., there also occurs a fixation of specific gravity at low levels. In acute and chornic nephritis with edema, and in moderate heart failure, there is a fixation of specific gravity about 1.020. In diabetes mellitus, there is often a fixation of specific gravity at about 1.035. Second, the amount of night urine. A night urine of more than 450 c.c. is suspicious of renal impairment. However, normal persons may void as much as 750 c.c. during the twelve hour night period. Third, the determination of the amount of the intake and output of nitrogen, sodium chloride, and water, will give much valuable information as to the functional efficiency of the kidney. At the present time, we are using the Mosenthal diet in the carrying out of this test.

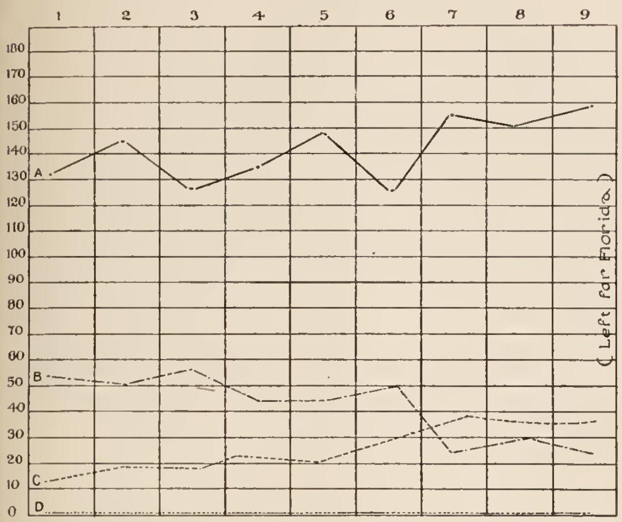

FIG. 1.—Case I, chronic nephritis with edema. Representation of results of kidney function studies for a period of nine months. A, systolic blood pressure; B, percentage output of phenolsulphonephthalein; C, blood urea; D, blood creatinine.

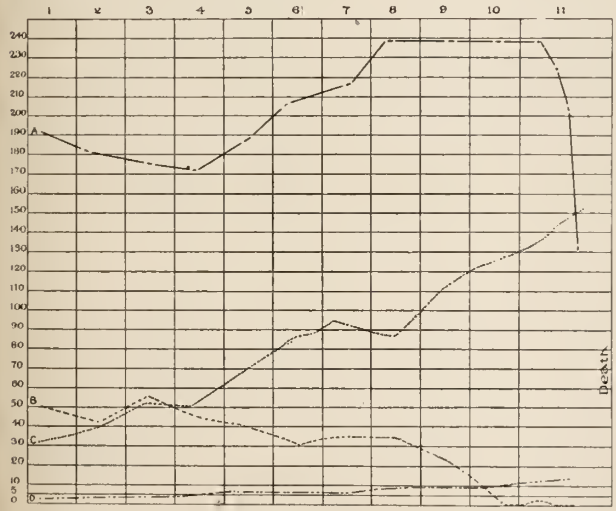

FIG. 2.—Case II, chronic nephritis with high blood pressure. Representation of results of kidney function studies for a period of eleven weeks preceding death. A, systolic blood pressure; B, phenolsulphonephthalein test; C, blood urea; D, blood creatinine.

SOME CHARACTERISTIC BLOOD CHEMICAL FINDINGS.

Rheumatism

In	Total N. Mgms. in	Urea N 100 c.c.	Uric acid of blood	Creatinine	Sugar Per cent.
Normal	25.– 30.	12.– 15.	1. – 3.	1. – 2.5	0.08–0.12
Chronic nephritis...	30.– 80.	15.– 50.	1. – 3.	1. – 3.	
Uremic nephritis...	120.–350.	80.–300.	4. –15.	4. –34.	0.10–0.20
Eclampsia	Practically no increase.				
Acute Intestinal Obstruction	75.–125.	45.–100.			
Bichloride poisoning	30.–100.	15.– 75.	2. –10.	1.5– 7.	
Acute nephritis (some cases) ..	30.–100.	20.– 80.	1. –12.	1. – 7.	
Thermic fever	25.–100.	15.– 80.	1. –15.	1. – 6.5	
Mild diabetes		12.– 15.		1. – 2.5	0.15–0.30
Severe diabetes ...					0.30–1.10
Renal glycosuria or renal diabetes ..					0.08–0.12
Gout			3.5– 6.		
Rheumatism (uncomplicated) ..			1. – 3.		
Essential hypertension ...	25.– 30.	12.– 15.	3.+	1. – 2.5	

Chemical analysis of the blood is very important. The constituents of the blood which are of importance in nephritis are the nonprotein nitrogen, urea nitrogen, uric acid, and creatinine. Certain types of nephritis are characterized by retention of these nonprotein nitrogenous substances; and practically all cases of uremia are preceded by an abnormal accumulation of these waste products in the blood. On an accompanying chart are shown some character-

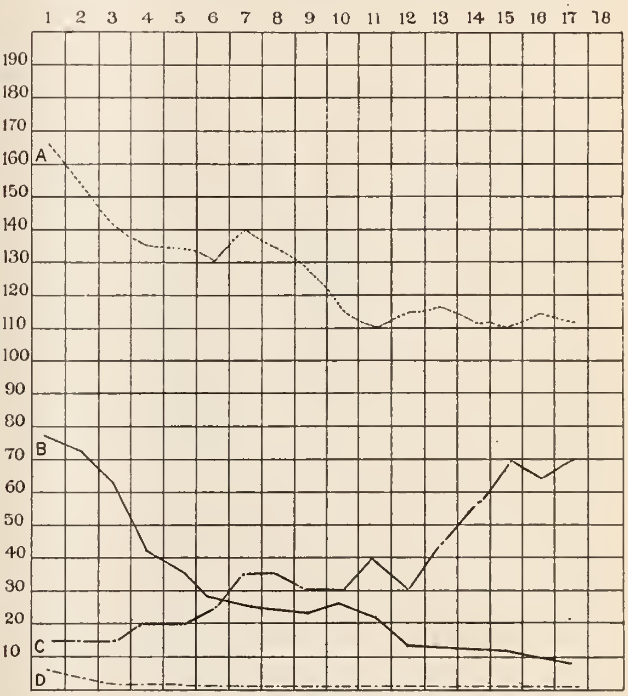

FIG. 3.—Case III, acute nephritis, representing kidney function studies for a period of seventeen weeks with apparently complete recovery. A, systolic blood pressure; B, blood urea; C, phenolsulphonephthalein output; D, blood creatinine.

istic blood chemical findings. A total nonprotein nitrogen of one hundred mgms. or a urea nitrogen of sixty mgms. or more to the one hundred c.c. of blood is indicative, in nephritis, of great retention,—and this is an unfavorable prognostic sign. A moderate amount of retention of the nonprotein nitrogenous substances (urea, uric acid, and creatinine) does not demand the total exclusion of proteins from the diet. Except in a few cases of acute nephritis, the finding of five mgms. or more of creatinine in one hundred c.c. of blood, in nephritis, has been followed by death within a few hours to several months,—the longest of which we have knowledge being seven months.

I believe in the use of all three of these tests. I feel sure that these three tests, done almost simultaneously, will yield more real information than will any other test or set of tests which have been used to determine kidney efficiency or inefficiency. My plan of procedure is to begin the two hour test at eight o'clock one morning and finish it at eight o'clock on the second morning. Before the patient eats breakfast on the second morning, blood is withdrawn for analysis. And, about eight-fifteen, the second morning, the phenolsulphonephthalein is injected intramuscularly, and the patient is given two glasses of water to drink. The urine is collected for two hours and ten minutes for this last test. And then the patient is given breakfast.

The larger charts represent the functional record of three cases of nephritis. Case I represents the type of chronic nephritis characterized by edema. This patient gradually grew worse and finally moved to Florida.

Case II is the typical chronic nephritic without edema and with high blood pressure. The most interesting feature about this patient is that he did not believe that he was sick, for his only symptom was nocturia; and he was busy attending to the affairs of life until his family almost forced him to bed, eight days before death. Six weeks before death, his blood creatinine reached the five milligram mark — which amount warrants an almost hopeless prognosis.

Case III is one of acute nephritis in which the functional tests showed gradual improvement and apparently complete recovery.

Doctors' Building.

The Effect of Serial Administration of Silver Arsphenamine on the Kidney*

By D. M. SIDLICK, M.D.,
and M. L. MALLAS, M.D.,
Philadelphia.

The short series of experiments presented herein were made with a view to determine the changes, if any, in the kidney following the serial administration of silver arsphenamine in the course of treatment of patients for syphilis. For the purposes of the present investigation, the blood of the patients before treatment, after every second treatment and again after the eighth intravenous injection of the new synthetic arsenical drug, was tested for urea, nonprotein nitrogen and creatinine following the technic of Folin and Wu (1). The urine was examined for albumin and casts. The data of the tests are presented in Charts I and II.

Ten patients were treated biweekly and were given eight intravenous injections of solution of the silver arsphenamine in doses of 0.2 gm. In Chart I are tabulated in the columns headed *Before treatment*, and *After the eighth injection* the blood urea, nonprotein nitrogen, and creatinine readings. The results of the examination of the urine are presented in the corresponding columns in Chart II. From a study of the charts it is obvious that the patients who have harbored the luetic infection for some time before submitting to treatment have apparently a specific nephritic condition varying in degree and type. However, the specific treatment if it does not improve, certainly does not aggravate the renal condition. In contrast to the conditions cited above, in patients in whom the nephritis is only a phase of the general morbid process of early syphilis, arsphenamine apparently brings about a clinical cure. The following two cases are cited herein as examples:

Case I.—B. G., aged forty-eight, was admitted to the syphilitic clinic in March, 1921, with a follicular type of syphiloderm. Analysis of the blood and urine before treatment revealed the following: urea, 26.1 mgm.; creatinine, 2.1 mgm., and nonprotein nitrogen, 53 mgm. to the 1000 c. c. of blood; a trace of albumin but no casts in the urine. After the eighth injection of silver arsphenamine, the blood urea, creatinine and nonprotein nitrogen readings were, respectively, 19.9, 1.67, and 26 mgm. to the 100 c. c. of blood. The urinary findings were normal.

Case II.—J. H., aged twenty-six, registered at the clinic in February, 1920. Upon examination the following conditions were noted: A maculopapular syphiloderm of two weeks' duration; a trace of albumin and three granular casts to the microscopic field in the urine; the blood urea 17.1 mgm., creatinine 1.8 mgm., and nonprotein nitrogen 37 mgm. to the 100 c. c. of blood. After the eighth intravenous injection of silver arsphenamine the blood examination for urea, creatinine and nonprotein nitrogen and the chemical and microscopic examination of the urine were negative.

Anderson (2) in his studies of the effect on the

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*From the Departments of Dermatology and Physiological Chemistry, Jefferson Medical College.

CHART I.

Silver Arsphenamine 0.2 Gram. Total Doses 1.6 Gram.

Case	Type of lesion	Duration	Before treatment			During course of treatment			After eighth injection		
			Urea	Creatinine	Nonprotein nitrogen	Urea	Creatinine	Nonprotein nitrogen	Urea	Creatinine	Nonprotein nitrogen
E. S.	Nonulcerative T. B.	12 months	24.8	1.47	52	23.8 22.8 22.4	2.1 2.0 2.0	47 45 43	21.1	1.89	44
H. T.	Latent		35.9	1.8	78	25.2 17.2 19.5	1.6 1.6 1.6	53 51 48	16.06	1.6	33
B. G.	Follicular syphiloderm	1 month	26.1	2.1	53	21 22.6 24.7	2.0 1.7 1.7	42 38 31	19.9	1.67	26
K. K.	Papulosquamous syphiloderm	3 weeks	16.3	2.1	33	15 14.2 14.8	1.9 1.66 1.68	31 32 32	28.5	2.88	30
C. B.	Nonulcerative T. B.	3 weeks	27	1.8	46	14.3 16.7 14.4	1.54 1.65 1.81	38 36 32	14.28	9.9	27
J. H.	Maculopapular syphiloderm	2 weeks	17.1	1.8	37	11.2 11.2 14	1.66 1.3 1.14	29 31 37	18.1	1.29	31
M. McL.	Nonulcerative T. B.	4 months	18.2	1.4	28	14.6 18.2 19.6	1.02 1.51 1.54	30 28 32	14	1.6	29
P. B.	Gumma	6 months	21.3	1.9	52	26.2 28 35	2 1.8 2.1	49 50 59	37	2	54
S. W.	Condylomata		16.3	1.21	39	18.2 119.9 18.6	1.52 1.64 1.3	28 31 30	17.4	1.42	31
I. S.	Papular syphiloderm		17.7	1.05	34	14.4 13 15.6	1.5 1.3 1.06	36 27 32	14.2	1.2	24

kidney, after prolonged administration of arsphenamine and neoarsphenamine concluded that the above mentioned drugs do not injure the kidney. In addition to the estimation of the urea nitrogen, creatinine and nonprotein nitrogen of the blood, Anderson studied the kidney function of syphilitic patients by means of the phenolsulphonephthalein test. He is of the opinion, that we ourselves hold, that if a nephropathy is present in a patient being treated for syphilis, the condition has been acquired prior to treatment.

CHART II.

Silver Arsphenamine 0.2 Gram. Total Doses 1.6 Gram.

Case	Type of lesion	Duration	Before treatment			During course of treatment			After eighth injection		
			Specific gravity	Albumin	Casts	Specific gravity	Albumin	Casts	Specific gravity	Albumin	Casts
E. S.	Nonulcerative T. B.	12 months	1023	Neg.	Neg.	1024 1019 1020	Neg. Neg. Neg.	Neg. Neg. Neg.	1026	Neg.	Neg.
H. T.	Latent	?	1012	Neg.	Neg.	1014 1008 1016	Neg. Neg. Neg.	Neg. Neg. Neg.	1016	Neg.	Neg.
B. G.	Papular syphiloderm	1 month	1016	Trace	Neg.	1018 1018 1016	Neg. Neg. Neg.	Neg. Neg. Neg.	1018	Neg.	Neg.
K. K.	Papulosquamous syphiloderm	3 weeks	1024	Cloud	Hyalin	1026 1024 1028	Neg. Neg. Trace	Neg. Hyalin Hyalin	1024	Cloud	Hyalin
C. B.	Nonulcerative T. B.	3 weeks	1014	Neg.	Neg.	1022 1019 1020	Neg. Neg. Neg.	Neg. Neg. Neg.	1017	Neg.	Neg.
J. H.	Maculopapular syphiloderm	2 weeks	1022	Trace	Neg.	1015 1020 1016	Neg. Neg. Neg.	Neg. Neg. Neg.	1019	Neg.	Neg.
M. McL.	Nonulcerative T. B.	4 weeks	1023	Neg.	Neg.	1019 1016	Neg. Neg.	Neg. Neg.	1021	Neg.	Neg.
P. B.	Gumma	6 weeks	1030	Neg.	Neg.	1025 1016 1030	Slight Trace	Neg. Neg.	1024	Neg.	Neg.
S. W.	Condylomata	?	1020	Neg.	Neg.	1016 1017 1015	Neg. Neg. Neg.	Neg. Neg. Neg.	1018	Neg.	Neg.
I. S.	Papular syphiloderm	3 days	1010	Neg.	Hyalin	1011 1014	Neg. Few Few	Neg. Neg. Neg.	1010	Neg.	Neg.

SUMMARY.

1. With the advent of silver arsphenamine for the treatment of syphilis it was deemed expedient to have some information in regard to its effect on the kidney.

2. Silver arsphenamine when given intravenously does not cause functional disturbance of the kidney.

3. A nephritic condition, if present in a syphilitic patient being treated with synthetic arsenical compounds in the form of the above mentioned drugs, has been acquired prior to treatment.

REFERENCES.

1. Hawk: *Practical Physical Chemistry*, 1918, sixth edition.

2. Anderson: *American Journal of the Medical Sciences*, vol. clxii, p. 80, 1921.

Spider Bite of the Glans Penis Simulating an Acute Abdominal Condition

By W. S. WOODY, B.S., M.D.,
Hopewell, Va.

Recently it was my privilege to see and treat a case of spider bite of the glans penis. The symptom complex was, to me, so remarkable that I searched through the available medical literature for information on the matter.

My search having availed me little, on account of the scarcity of material on the subject, I then inquired from several sources of information—including the Surgeon General's office. Here again I was disappointed with the reply that there was little available literature on spider bites and practically none on bites of special parts.

CASE.—The patient—a negro of sixty-two—walked into my office complaining of bilateral pains in the back and throughout the upper abdomen. Being occupied with another patient at the time, I was unable to give the patient my immediate attention. However, his pain became rapidly so severe that it was necessary for me to treat him at once.

Inquiry brought out that he had been perfectly well until about half an hour previously. While seated on a privy hole he felt something touch him on the glans penis. He described the sensation as a slight sting. On looking down he saw the spider, which he said was a small and insignificant looking one.

He paid little attention to the bite and resumed his work. In about fifteen minutes he began to feel pain in his lower abdomen which in a few minutes spread upward to the upper abdomen and lumbar region. This rapidly became worse so that he was obliged to quit work. He then walked to my office, which occupied about ten minutes of his time, and about five minutes later was suffering intense agony.

An examination showed no mark or other indication of the bite on the penis and there was no local pain or tenderness. The entire abdomen, especially the epigastric region, was hard, of a boardlike rigidity and very sensitive to pressure. The temperature was 98°, pulse 62, the patient was drenched in a cold perspiration and the whole picture was one of intense suffering. There had been no nausea, vomiting or diarrhea.

A quarter grain of morphine given hypodermically failed to relieve the pain and it was necessary to repeat this in a short while. This in turn only modified the pain to a sufficient degree to make it bearable and he was still suffering when removed to his home an hour later.

On visiting the patient six hours later I found that he was still suffering, but less intensely. He described the pain now as being a rather severe, dragging sensation in the epigastrium and an ache in the lumbar region. There had developed an intense itching in the soles of the feet. There was still no nausea, vomiting or diarrhea. He had not emptied his bladder since morning. The temperature was normal, pulse 70. The abdomen was still somewhat rigid throughout and sensitive to pressure. There was no distention. No peristaltic movements could be heard on auscultation. There was still no pain, tenderness or signs of inflammation about the penis.

On a second visit on the morning of the second day the pain was about the same. He had been restless and unable to sleep throughout the night. The temperature was 99°, pulse 80; the itching of the feet had subsided. The bowels had not moved nor had he voided urine. The abdomen was slightly distended; still sensitive to pressure, but the rigidity had largely disappeared. No peristaltic movements could be obtained on auscultation. The bladder was distended above the symphisis pubis. The patient was catheterized. He was ordered to have a soapsuds enema and later half an ounce of magnesium sulphate.

An examination of the urine at this time showed a heavy cloud of albumin. A blood count showed 4,300,000 red and 7,200 white cells. Differential count was not made.

On my third visit on the night of the second day, and twelve hours later, the pain was still severe and dragging in the back and upper abdomen and the epigastrium was still sensitive to pressure. The bowels had still not moved. The enema had returned only colored water. The temperature was 99.6°, pulse 86, abdomen somewhat distended and tympanitic. Still no peristaltic movements could be heard. The bladder was again distended above the symphisis. A second catheterization was done. The patient had been drowsy and restless in spells. A high compound enema and a full dose of castor oil to be followed by magnesium sulphate, and this in turn to be followed by a second high enema a few hours later were ordered.

The next visit on the afternoon of the third day found the patient in what might almost be called a typhoid state. He complained of headache and dull pain in the back and abdomen. He was restless and drowsy by spells. The abdomen was much distended and tender. There still were no peristaltic movements to be heard. There had been no results from the purgatives or enema, nor had he voided except in a few dribbling drops; bladder much distended. The temperature was 100.6°, pulse 102, and I noticed for the first time that the sclera showed a slight degree of jaundice. I again catheterized him, ordered an enema with instructions to leave the rectal tube in place for a half an hour.

The same night, about eight hours later I returned with Dr. J. Bolling Jones in consultation. We found on arrival that the patient had passed a large quantity of gas, that he had had a good movement, and that he had voided voluntarily for the first time since being bitten. The improvement in his condition was striking. He was no longer drowsy. The abdomen was no longer distended and only slightly sensitive to pressure. Auscultation showed that peristaltic movements had returned. He looked much improved and said that he felt a hundred per cent. better. A blood count taken now showed 4,000,000 red cells and 7,000 white cells.

Subsequently his recovery was uneventful with the exception that on the fifth day a mild epididymitis developed. This, however, yielded to local treatment and suspension of the testes. He returned to work at the end of a week and has been well since.

The points in connection with the case that struck me were: The rapidity with which the toxin seemed to travel to the splanchnic area; the marked severity of the primary signs and symptoms which made it closely resemble in some respects an acute surgical abdomen, and the entire absence of local signs at the site of the bite.

My conclusions are that the toxin traveled along the nerve trunks to the splanchnic area resulting in the severe pain, rigidity and temporary paralysis of intestines and bladder. That the secondary typhoid-like symptoms were due rather to the autointoxication, which resulted from the intestinal stasis and urinary retention, than to the action of the toxin itself; and that the mild degree of jaundice was a socalled hematogenous jaundice resulting from the hemolytic action of the toxin.

My inquiry at the Surgeon General's office furnished the following information:

"The poisonous spiders of North America are divided into two groups. A large, hairy type known as the Tarantulus found in the most southern and southwestern states and in Mexico. A smaller coal black species, the Latrodectus mactans, which reaches as much as half an inch in length and usually has two longitudinal dorsal markings in red or yellow. This species is more widely distributed and found inhabiting old stables, outhouses and wood piles. Severe and even fatal poisoning may follow the bite of this insect. The toxin is a powerful hemolytic agent and experiments with it indicate that it is a heart depressant as well."

Contrary to the findings in my case Dr. J. C. DaCosta has the following to say in a short paragraph in his textbook on surgery:

"The bite of large spiders is productive of inflammation, swelling, weakness and even death. The bite of the poisonous spider of New Zealand produces a large white swelling and great prostration. Death may ensue or the victim remain in a depressed, enfeebled state for weeks or even months."

A Report on the Steinach Operation in Senility and Premature Senility

By ABR. L. WOLBARST, M.D.,
New York.

Considerable evidence has accumulated to prove beyond any doubt, if such proof were demanded, that the testes exert a twofold influence on the human economy. One of these influences or functions, spermatogenesis, may be compared to the external secretion of other glands; the products of this function, the sperma, are demonstrable by the microscope. The second function is the elaboration of an internal secretion, known as an activator or hormone, and although it cannot be demonstrated by histological or chemical methods, this hormone undoubtedly furnishes the secondary sex characteristics of the individual. If, therefore, it is true that the endocrine system determines the mental and physical makeup of the individual, it is likewise true that his gonadal characteristics and potentialities are determined by the internal secretion of his testes.

It is commonly agreed that the endocrine properties of the testes are located in the interstitial tissue or Leydig cells, which lie between the generative tubules of the organ. It is when this interstitial tissue undergoes pathological or senile degeneration that the gonadal changes take place which make themselves evident by the appearance of characteristic symptoms of senility in the individual affected.

To induce regeneration in these altered tissues or (socalled) glands—in other words, to produce rejuvenation, restitution, or reactivation, or, better still, to retard senility, various methods have been employed, all having for their object the restoration and future maintenance of the normal gonadal balance between spermatogenesis, on the one hand, and activation or testicular hormone production, on the other. This restoration of balance is attempted by resort to artificial means which inhibit the generative tissues (spermatogenesis) and thus bring about a compensatory regeneration of the Leydig cells or interstitial tissues, with the accompanying stimulation of hormone production and the socalled "rejuvenating" effects on the endocrine system.

Three methods stand out prominently in these experimental researches in animals:

1. Transplantation in the senile subject of a gonadal organ from a young animal of the same or related species;
2. Repeated mild exposure of the gonadal organs to the röntgen ray:
3. Ligation and resection of the vas deferens.

The present paper concerns itself only with the last named method, as applied to man, which has been made popular by the widespread interest in the experimental work of Steinach, of Vienna, and those who have followed him.

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*Read before the American Urological Association, Atlantic City, N. J., April 26, 1922, and before the New York Physicians' Association, New York, April 27, 1922.

Briefly, this is the theory upon which the method is based: The immediate sequence of the resection of the vas deferens is a spermastasis, that is, a stasis and absorption of the sperma which are imprisoned within the testes as a result of the closure of their efferent duct. This imprisonment and stasis are succeeded by gradual atrophy of the generative or spermatogenetic tissues. With the exception of the basal cells, all the spermaforming cells participate in this atrophic process; coincidentally, however, there is a decided compensatory proliferation and stimulation of the interstitial cells of Leydig, which constitute the socalled puberty gland of Steinach.

With the passage of time, several months, in fact, the spermatic cells seem to regenerate to a certain degree, the hypertrophy of the Leydig cells diminishes somewhat, and the balance between the two becomes stabilized. The end result is a massive deposit of testicular hormone into the endocrine system, analogous to that which takes place in a successful transplant of a gonadal gland; but it is well to remember the important fact that the increased hormone supply is created entirely within the body of the patient himself and is not taken from a monkey or another human.

A careful study of this theory leads to the conclusion that there must be some other factor in the case than the mere occlusion of the vas and its consequent spermastasis; for it is perfectly obvious that every case of epididymitis prevents the escape of sperma from the testes, yet we do not observe any unusual sexual or general reactions in these cases. Nor is there any record of endocrine changes of an appreciable character in the numerous cases in which vasectomy was performed on habitual criminals, mental defectives and the insane, under legal sanction in a number of the States within the past fourteen or fifteen years.

On the other hand, it has been suggested that the physical wellbeing and restored sexual powers which often follow a successful prostatectomy for senile hypertrophy, are to be considered the result of an unintentional Steinach operation, this being brought about by the accidental injury and closure of the ejaculatory ducts in the course of the removal of the prostate. If this be true, then we must consider such an improvement in the condition of the patient as prima facie evidence of an improperly performed operation, for it is the general aim in doing prostatectomy to avoid such injury to the ducts.

However this may be, the fact remains that this sudden spermastasis following vasectomy does produce changes in the endocrine chain in certain cases.

It would seem, giving the operation the benefit of every doubt, that its most effective field is found in cases of endocrine insufficiency, and that such results as follow its performance are caused by the sudden shutting off of the outlet for the sperma, with its immediate effect of a traumatic shock to the entire endocrine apparatus of which the testes are so important a part. If this reasoning is correct, we should expect satisfactory results in these selected cases, and no result whatever in cases with normal endocrine supply.

How the endocrine system as a whole is affected by this operation, we can only surmise, but it is safe to say it would be impossible to produce such a marked change in one portion of the endocrine chain without affecting to a greater or less degree its entire mechanism. This is made evident by the fact that, in successful cases, all the body functions give evidence of having been reinforced, stimulated and strengthened.

The literature on the subject as applied to man is still very meagre, and there has not been a sufficient lapse of time to enable us to give a proper evaluation to this method, but the search for perpetual youth is as old as life itself, and anything that tends even in the slightest degree to retard senility and increase the period of human activity is worthy of serious study.

The present paper is intended merely as an unbiased report of my clinical experience in eleven cases in which this method was employed. A word as to the operative procedure: Under local anesthesia the vas deferens was exposed, and by careful dissection separated from its fine artery, veins and nerves. Two strong ligatures were applied about three fourths of an inch apart, as close to the epididymis as possible, and the portion of the vas between the ligatures resected. The skin wound was closed and covered and with a dry dressing, the scrotum supported by a well fitting suspensory and the patient confined to bed for thirty-six or forty-eight hours.

Eleven patients were operated on, of whom seven were actually senile and five were prematurely senile. It is recognized, of course, that this is not a large experience from which to draw conclusions, but it is evident that the results attained in these cases will have a certain value in our appraisal of the merits of this operation.

The differentiation between the senile and prematurely senile cases was determined by the age of the patient, his general physical condition, and the outstanding physiological disturbance which demanded relief. In the premature cases we were dealing with men varying in age between forty and fifty-two, prematurely gray, generally weak and played out, and presenting the predominating symptom of sexual impotence.

Of these seven cases of actual senility five of the men were in a home for aged men, and were typical of the decrepit and hopeless inmates of such institutions. The operation was undertaken in the hope that it might result in a stimulation of such gonadal endocrines as still remained in their emaciated bodies. They were not informed at any time what effects were sought to be produced, but were persuaded to submit to this painless operation in the belief that it might strengthen them and relieve them of their predominant pains and infirmities.

A detailed review of these cases, taken verbatim from the record charts, is herewith given:

Case I.—M. B., aged sixty-one. Previous history negative. Complaint, general weakness and cachexia. October 10, 1921. Examination: Heart and lungs, negative; superficial and deep reflexes, slightly decreased; blood pressure, systolic, 220; diastolic, 130; marked senile arcus. On October 17, the operation, right vasectomy, was performed. On November 28, general condition much improved as to color of skin and general nutrition; patient felt livelier and stronger; systolic, 190; diastolic, 120; on April 18, 1922, the condition was very good; the patient appeared perceptibly younger; felt stronger and livelier; systolic, 180; diastolic, 100. The operation resulted in a decidedly noticeable benefit to the patient.

Case II.—S. B., aged sixty-five. Physical examination, September 2, 1921: Heart action somewhat irregular, skipped systolic beats every three and four beats; slight myocardial weakness; lungs negative; reflexes normal; osteomyelitis of tibia with a deep scar about five inches long on right leg; blood pressure, systolic, 180; diastolic, 120; mild arcus; generally feeble. On September 5, 1921, a double vasectomy was performed. On November 1, 1921, reexamination: General appearance better, color improved, physically felt a little more vigorous. Systolic, 155; diastolic, 80. April 18, 1922, heart action regular, skipped beat absent, physical condition much better than before operation; systolic, 170; diastolic, 100; pulse, 72. The changes noted, seven months after operation, are a better general physical condition, lowered blood pressure, improved heart beat.

Case III.—E. K., aged seventy-two. Physical examination, October 12, 1921: General condition was poor and asthenic; defective nasal breathing; moderate arcus senilis; heart action regular and fair; diffuse bronchitis; blood pressure, systolic, 190; diastolic, 130; pulse, 98; knee reflexes diminished. On October 14, 1921, double vasectomy was done. On October 16, complained of headache and anorexia; October 17, felt better and slept well; October 18, complained of feeling very weak; October 25, general condition fair, complexion good, felt stronger; systolic, 120; diastolic, 60; pulse, 60. April 18, 1922, out of town visiting relatives; but nurse and physician stated that his condition had improved perceptibly since operation. Six months after operation, predominating changes are a marked lowering of blood pressure, and generally good condition.

Case IV.—J. D., aged eighty. October 2, 1921, examination: General condition was fair; arcus well developed, poor reaction of pupils; teeth in poor condition; myocardial weakness of heart; lungs, sibilant râles all over the chest; extremities, cold, cyanosed, varicose veins over lower extremities; reflexes normal; blood pressure, systolic, 180; diastolic, 90. On October 9, 1921, a double vasectomy was done. October 17, had been vomiting his food since the day of operation, and felt very weak; October 19, felt better but very dizzy; systolic, 170; diastolic, 120. In February, 1922, about four months after operation, a large mass was observed in the right hypochondrium and epigastric region; diagnosis, cancer of stomach and adjacent organs; patient died April 4, 1922.

The vomiting and gastric distress after the operation may have been the earliest symptom of the presence of the gastric cancer; possibly the operation stimulated the cancerous growth.

It is thus apparent that four patients have materially benefited by the operation and have maintained this improvement from six to seven months since the operation; in three cases, failure or incomplete data must be recorded.[1]

Taking up the cases of premature senility, characterized by sexual impotence:

Case Ia.—S. H., aged fifty-four, widower twenty years. Chief complaint, impotence, duration twelve years. General health good, but looked like sixty-five or over. Contemplated matrimony. Had been under various forms of treatment without benefit. Cystourethroscopy showed a very large, inflamed verumontanum; and congested posterior urethra. Local applications through the urethroscope and prostatic massage seemed to improve his sexual condition, but the improvement stopped as soon as he suspended treatment. Vasectomy was advised. On October 4, 1921, a double vasectomy was done. On April 18, 1922, the patient reported as follows: Three months ago, he married a young woman; for nine weeks was absolutely impotent, then sexual power began to appear, gradually growing stronger, and the patient had been indulging sexually practically every day, with few intermissions. Erections were not as strong as they were in his youth, but they were satisfactory. Appeared healthy and ruddy. Satisfactory result, six months after operation.

Case IIa.—B. T., aged forty, married eighteen years, three children. Was impotent for the past three years. Examination pointed to endocrine insufficiency as cause. Vasectomy was advised and accepted. On February 16, 1922, a double vasectomy was done. Had not responded to frequent requests for an interview, but his family physician reported (April 18, 1922) that the man seemed to be satisfied with the results of the operation. He could not give any further details.

Case IIIa.—B. M., aged forty-seven, married, two children. Complaint, physical weakness and sexual impotence. Treatment had been of no avail. On November 25, 1921, a double vasectomy was performed. February 14, 1922, interviewed (over telephone), patient declared he felt stronger generally, with frequently recurring erections at night. Had not attempted coitus on my advice to refrain for three months after operation. On April 4, 1922, telephoned again, and reported having attempted coitus several times in the past four weeks, with fairly satisfactory results, he believed he was getting stronger gradually. A fairly satisfactory result, five months after operation.

Conclusions: If any conclusion is to be reached as the result of a study of these cases, one would be justified in saying that the operation has been distinctly advantageous to the patients who have been subjected to it. In the actually senile patients, the most striking result has been the marked decrease in blood pressure, and a feeling of wellbeing that is appreciably noticeable. In these cases the sexual function seems to have become extinct and has not been influenced by the operation. In the prematurely senile cases, there is reason to believe that sexual function has been stimulated materially by operation.

In view of the fact that it is painless, that it involves no risk, and that there is but little loss of time, there seems to be no reason why this operation should not be advised in every case suggestive of endocrine insufficiency. In young men, the unilateral operation is advised as sufficient for the purpose; in cases where procreation no longer is desired, the double operation is to be recommended.

I desire, finally, to express thanks to Dr. Hyman Goldstein for his assistance at the operations.

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[1] Cases V, VI, VII and IVa have been omitted for lack of space. A record of these cases will appear in the author's reprints.

Editorial Articles

PROGRESS

It is an axiom of business and professional men, that their occupation or profession cannot stand still. They must make progress or fall behind. This selfevident principle applies to the publication of a progressive medical journal and the publishers of this paper have from the first applied it to the management of the NEW YORK MEDICAL JOURNAL.

Let us briefly review its progress, since it was purchased on July 12, 1900, from D. Appleton & Company, book publishers of this city. Dr. Frank P. Foster, then dean of medical editors in this country, continued as its editor in chief, with Dr. Kenneth W. Millican and Dr. Reed B. Granger as assistant editors. It was issued on August 7, 1900, under the ownership of the A. R. Elliott Publishing Company, incorporated under the laws of the State of New York.

On June 8, 1903, the *Philadelphia Medical Journal,* which had been ably edited by Dr. George Gould, was purchased; and on June 20th of that year, the Journal appeared under the caption: NEW YORK MEDICAL JOURNAL AND PHILADELPHIA MEDICAL JOURNAL, CONSOLIDATED. Splendid contributions were constantly received from the leading men of Philadelphia, Baltimore, and other medical centres. This purchase largely increased the circulation.

In October, 1905, Messrs. Lea Brothers & Company, medical book publishers of Philadelphia, unsolicited, offered to sell us *The Medical News.* It was purchased; and on January 6, 1906, the Journal appeared under the heading, NEW YORK MEDICAL JOURNAL, INCORPORATING THE PHILADELPHIA MEDICAL JOURNAL AND THE MEDICAL NEWS. Dr. Smith Ely Jelliffe was the editor of *The Medical News,* and he joined our staff. The Journal represented a large number of high class contributors and a cleaner, paid-up subscription list it would be hard to find. The consolidation of these three weekly medical journals produced the oldest and the most widely circulated independent medical Journal in the United States. In the meantime we lost four great medical editors; two by death, Dr. Frank P. Foster and Dr. Claude L. Wheeler. Dr. Kenneth W. Millican was called to the staff of the London *Lancet;* and Dr. Charles E. de M. Sajous, whose large practice and medical literary work compelled him to resign, much to our regret. He has always been a friend and guide.

On the third of last month was consummated the purchase of the *Medical Record* from Messrs. William Wood & Company, New York, the well known medical book publishers. They found it necessary to devote all of their energy to the book publishing business. The *Medical Record* is a splendid publication, of large circulation, which in the fifty-six years of its usefulness has done almost matchless service to the medical profession. The amalgamation of these four journals is a vast broadening of their usefulness to the medical profession and through the medical profession their usefulness to humanity. The union enormously strengthens independent medical journalism. The true professional spirit of Dr. Thomas A. Stedman and the *Medical Record's* championship of therapeutic liberty have long been acknowledged by the publishers of the NEW YORK MEDICAL JOURNAL. It was for this reason that the *Medical Record* was purchased so that the two clean cut medical periodicals could join forces in the great work that lies before us, and this work will be vigorously carried on.

With the program that has been laid out, we feel safe in saying that we shall be able to secure and give to the patrons of this JOURNAL the best that can be produced.

A. R. ELLIOTT, *President,*
A. R. Elliott Publishing Company.

DR. GREGORY STRAGNELL.

With the first issue of the NEW YORK MEDICAL JOURNAL AND MEDICAL RECORD, the publishers take this occasion to introduce to our readers Dr. Gregory Stragnell as the editor in chief. He has been associated with the NEW YORK MEDICAL JOURNAL for over three years, becoming associated with us shortly after his return from service in the Allied armies. He is thoroughly qualified to conduct the JOURNAL in a progressive manner and at a highly scientific level.

Dr. Stragnell came originally from Colorado, having begun his academic studies at the University of Denver. He graduated from the College of Physicians and Surgeons, Columbia University, in 1914, and continued his studies in Paris, Vienna and Zurich, specializing in neurology and psychopathology. At the beginning of the world war he volunteered his services to the Allied armies and saw service on many fronts for a period of over three years. In the course of hostilities he was twice wounded and in 1915 was taken prisoner. He was finally exchanged through Switzerland and again resumed active service. Finally he was put in charge of two large French hospitals, where he served until the close of the war. At present he is one of the collaborating editors of the *Journal of Nervous and Mental Disease* and a frequent contributor to journals like the *Psychoanalytic Review* on special psychopathological subjects.

During his military service Dr. Stragnell came in personal touch with many of the leading European physicians and surgeons and in this way he is enabled to secure contributions from prominent men in important European medical centres.

Since Dr. Stragnell has been associated with the NEW YORK MEDICAL JOURNAL he has secured the services of over a score of medical editors in special fields of medicine, and these men are cooperating with him to make this journal the leading medical publication of America.

THE INTERSTITIAL CELLS

From time immemorial man has sought to prolong life. Though he has recognized the futility of his fight against Nature's dictum that everything that is born must die, he has persisted doggedly in his attempt to stay young longer than Nature decreed. The fountain of youth has been sought by mere dreamers and by serious minded scientists, and while their methods have differed their purpose has been one. So that it is probably within the truth to say that every generation since the birth of man has had its student of this problem and his remedy. The last generation had its Brown-Séquard; today, we have our Steinach. Methods differ, but aims do not change. We want to stay young; we do not want to die; we have work to do or pleasures to live for, but we want to stay young.

Hence may we account for the universal interest manifested in monkey gland transplantation and in the Steinach method of vasectomy. Both of these methods, at least, have a theoretical basis upon which they will bring analysis and study, for both are based on the theory that we are as old as our endocrines, and if we can put a new supply of fresh endocrine products into our tired bodies, we can attain the end sought and stay young somewhat longer.

Transplantation of gonads cannot become popular, for monkeys are scarce and their gonads do not always stay where they are put. The Steinach method of vasectomy, however, offers the possibility of obtaining what we have long sought, at little or no risk, with slight loss of time, and a fair measure of success.

In this issue of the JOURNAL Wolbarst gives a report of a number of cases in which the patients were operated upon. The article brings up a number of interesting points. Are we face to face with a real rejuvenator? This question suggests itself when we analyze the reports that are coming to us from various sources. It is plain that this operation has some effect on the endocrine system; but how does it obtain these effects and how long will they last?

It has been suggested that the operation may be of value only in such cases as present a disturbance in the endocrine balance, and that this balance is set right by the traumatic shock to the endocrine chain produced by the operation. This may be so, and this view also may explain the fact that patients suffering from acute and chronic epididymitis do not present visible changes in their endocrine mechanism. It is quite possible that the inflammatory closure of the tubules in the epididymis does not carry with it the required trauma, and hence the mechanism is not affected to any appreciable degree.

We note with peculiar interest the statement that a common sequel to the operation in aged, senile subjects, is the lowering of the blood pressure from twenty to fifty mm. Surely this alone is worth striving for, and if it can be shown on further investigation that these conclusions are correct, we have in the Steinach operation a most valuable addition to the therapeutics of high blood pressure.

Another thought suggested, is that this operation is not necessarily to be used for sexual weakness alone, but rather as a general tonic in which the sexual function, among others, is benefitted. There is reason to believe that this is a far more important feature of the operation than its advocates have been willing to admit, but if it proves to be a general tonic, especially for the aged and the near aged, Steinach will have presented a veritable boon to mankind.

PHYSICIANS NEEDED

Columbia University is one of the most richly endowed and the largest of the universities, and its school of medicine has been one of the most progressive in adopting new laboratory courses and enlarging its curriculum. In his annual report as president of the university Dr. Nicholas Murray Butler presents some important matters in regard to medical education. "The true aim of the medical school," says President Butler, "should be to give instruction in fundamental principles and methods, to bring the students into contact with realities, to train him in habits of observation and inference as to physiological and pathological phenomena, and to give him knowledge of where to look for the additional or specialized information that he may need before his own experience has sufficiently widened and deepened to bring it to him."

President Butler realizes that the purpose of the medical school is primarily to train physicians, and not scientific investigators. "It would be a sorry day," says Dr. Butler, "for the public health and for the public satisfaction if the physician of large, practical experience, wide human sympathy and keen insight into human nature were to yield his place to the expert with the microscope and the test tube. The scientific aspects of medicine must not be permitted to override its human aspects."

Dr. Butler has put into words a feeling which is prevalent throughout a large portion of the medical profession. The true province of the physician is to heal the sick. Under the rapid development of specialism in medicine this function has been lost sight of in some of the larger medical schools, which train scientific investigators instead of physicians. There is a need for scientific investigators, but the crying need is for men of broad, medical education whose senses and powers of observation, as well as their minds, have been carefully trained; men who depend mainly on their own trained powers of observation and deduction rather than on the differential blood count, the sphygmographic tracing of the electrocardiogram, or the findings of the test tube. All of these aids to diagnosis are of value and should be made use of, but none of them can take the place of the trained and acute observer.

The leaders in medical education have made the mistake of trying to combine the laboratory specialist with the general practitioner, and as a consequence the public has suffered and is suffering from a dearth of doctors.

CONSERVATION OF THE EYES IN INDUSTRY.

Protection of the eyes against disease and industrial accidents, proper illumination, and the correction of refractive errors have been urged by one generation of ophthalmologists after another, all speaking from the professional, or rather the humanitarian viewpoint. The average medical man knows the statements are true, he approves the arguments and the urgency with which they are pressed, but he sees no way in which he can aid in improving matters. Whenever opportunity offered the ophthalmologist has made his plea before school boards, engineers, and employers of labor, and, through these, tangible results have gradually become apparent. It seems hardly possible that scarcely a generation ago an inspector of the New York City Board of Health was censured for stating in an official report that the conditions prevailing in certain schoolhouses were detrimental to the eyes of the children, because such conditions now are recognized as bad and the children have better light and seating.

Many ophthalmologists exercised their inventive abilities and constructed devices to protect the eyes of workmen, and interested individual employers in their use, but such devices were likely to be crude, fitted perhaps for one kind of work, but needing modifications to make them of general benefit. Many of the problems involved could not be solved. Even when employers entered heartily into the plans, opposition was encountered from the workmen who were the beneficiaries. An employer once said to a prominent specialist, who had just taken a piece of steel from within the eye of one of his workmen, "I have equipped my shop with every protective device of which I know. When I am in the shop the men use them, when I am out they discard them, and this is the result." It certainly was discouraging.

How to obtain the right kind of light and the right amount of it without sharp contrasts and glare, was a problem handed over to the engineers. The ophthalmologist has watched with pleasure the improvement in lighting conditions, but the problem has not yet been fully solved.

Now the subject of conservation of the eyes is brought to the notice also of the general public, from the point of view of eliminating waste from industry. In a bulletin issued under the auspices of the Federated American Engineering Societies the protection of the eye from hazards, correction of substandard vision, and illumination are discussed as means of avoiding loss from inefficiency and waste. Though it appears like a coldblooded business proposition, the humanitarian element shows itself when one of the writers queries, "How many valuable eyes a year can the council be instrumental in saving, and what can it contribute to the sum total of human happiness by the corrective measures of removing eyestrain and the fatigue resulting therefrom."

The bulletin tells us that a number of large industrial plants enforce the use of devices to protect the eyes of their workmen, and that definite codes have been formulated in some industries stipulating all occupations in which goggles, for instance, must be worn. One steel company reports that before it adopted and enforced the rule compelling workmen to wear goggles in 1912, it was not unusual for eyes to be injured or destroyed by flying bits of steel, and that since that date not an eye has been lost in its shops. But such protection does not seem to be commonly afforded throughout the industry. The bulletin says that knowledge regarding the characteristics of adequate protection appears to be limited to a few, mainly to those responsible in the larger organizations, and that it is most important for the smaller groups to realize the necessity of safeguarding the eyes. There are objections to the wearing of goggles which are real, such as the restriction of the field of vision, and much of their value, as well as the comfort of the wearer, depends on the exact fitting of the frames to the face, which is not universal, to say the least.

Doctors and laymen alike have become weary of listening to reasons why refractive errors should be corrected, especially since the pleas of the ophthalmologist have been found useful for advertising purposes by those who wish only to promote sales of glasses, but they may be interested to learn that one company obtained twenty-eight per cent. increased productivity for two years after all its employees had had their eyes examined and glasses furnished when needed. The percentage of employees who did not need glasses was very small. It was found that eight and three tenths per cent. were wearing satisfactory glasses, new glasses were ordered for eighty-three and three tenths per cent., and no glasses were needed by only eight and four tenths per cent.

Be that as it may, we are more than glad to see the subject of conservation of the eye taken up as a matter of industrial waste. Making it a matter of dollars and cents to the employer certainly promises to speed up the progress which has hitherto been made largely from humanitarian motives, and anything which will aid such a speeding up will be welcome.

CARE OF THE BLIND.

The university graduates and undergraduates of Germany who were blinded in the war are taking active steps to reestablish themselves as useful members of the social and economic world according to an article in a recent issue of the *Berliner Tageblatt*. An association has been formed with headquarters at Marburg, which aids sightless students to resume their studies and helps graduates to secure positions, and which is developing a large technical and scientific library for the blind. Among the special classes organized and conducted by this association are those for the study of law, political science, philology, theology and medicine. Among Marburg graduates are teachers, preachers, lawyers, state and municipal employees, political economists, doctors, writers and lecturers. At first the feeling was prevalent that these blinded veterans should be supported by the state all their lives without working, but it was soon evident that this was a poor policy in many ways, especially as it deprived the men themselves of any particular interest in life, so an appeal was made by one of Germany's most noted eye specialists to the industrials to help rehabilitate the blinded soldiers. A large electric concern responded at once and other companies quickly followed their lead, with the result that blind workers are now being advantageously employed in Germany in more than a hundred different kinds of labor. Incidentally, the article states that the number of war blind is steadily increasing.

DANISH INVALIDITY INSURANCE.

Denmark has a new invalidity law which went into effect last October which is compulsory as to all employers but voluntary as to employees except members of recognized sick funds, says the *Monthly Labor Review* for January, 1922. The funds are obtained from premiums paid by insured employees, employers, the state, and various communes, and provide for a pension of eight hundred kroner annually with medical attendance under certain conditions. The pension is reduced in the case of married persons both of whom are eligible for pensions or when the insured person receives aid from other sources. "In case there is a probability that a case of threatened invalidity may be warded off, or a case of existing invalidity terminated or decreased below the limit established by proper medical or surgical care, the insured person must submit to such care, but he is not compelled to undergo any operation which may endanger life or health," according to the *Review*.

The fund is administered by a committee of three persons, one appointed by the minister of finance, one by the minister of the interior, and one the sick fund inspector who is also the manager. A tribunal consisting of a jurist appointed by the king, two physicians, two members of recognized sick funds, and one employer is provided to determine whether or not invalidity exists. Invalidity under the law is defined to mean a reduction of earning power to a third or less.

ZINC OXIDE POISONING.

A troublesome dermatitis that is prevalent among workers who are exposed to zinc oxide dust is described in the *Monthly Labor Review* for January, 1922, as the result of an investigation conducted by Dr. John A. Turner. Of seventeen men examined in the bag room of a zinc oxide manufacturing plant, all but three had had attacks of what they called oxide pox and eight were suffering from the disease at the time. The pox occurs chiefly where there is a rubbing together of two body surfaces and is increased by perspiration. It takes the form of a papular pustular eruption accompanied by intense itching and persists for eight or ten days before drying up. It is followed by slow but marked peeling of the skin. Zinc oxide is a nontoxic substance, but it may act as a conveyor of bacteria. Workmen said that daily bathing prevented any symptoms of the poisoning. Turner recommends the wearing of closely woven working clothes which should be frequently cleansed, and the provision of facilities so that workmen in these plants can bathe at the close of work.

News Items.

State Charities Aid Association Fifty Years Old.—On May 11th the State Charities Aid Association will complete its fiftieth year. The anniversary will be suitably commemorated with a state wide celebration, plans for which have been maturing for several months.

New Mental Clinic.—The forty-first mental clinic established by the State Hospital System has been organized in Troy through the efforts of the Hudson River State Hospital and the Mental Hygiene Committee of the State Charities Aid Association. It is under the direction of Dr. Walter G. Ryon, Superintendent of the Hudson River State Hospital.

Annual Meeting of Women's Medical Society.—The annual meeting of the Women's Medical Society of the State of New York was held in Albany on April 17th. The following officers were elected: President, Dr. Harriet M. Doane; first vice-president, Dr. Clara A. March; second vice-president, Dr. Marie L. Chard; third vice-president, Dr. Emily Dunning Barringer; secretary, Dr. Mary Dunning Rose; treasurer, Dr. Florence A. Sherman.

X Ray Laboratory Permits.—The work incident to the new Section 107, added recently to the Sanitary Code by the Board of Health requiring x ray laboratories to have a permit before they can be operated legally, is being handled by the following committee: Chairman, Dr. H. G. MacAdam, Chief of Division of Institutional Inspection; medical expert, Dr. Leon Theodore LeWald, F.A.C.P.; technical expert, Mr. Montford Morrison, M.S.M.M. E.M.E.E. Applications for permits should be made in writing and addressed to Dr. H. G. MacAdam, 505 Pearl Street, Manhattan.

Officers and Committees of Medical Society of State of New York.—At the annual meeting of the Medical Society of the State of New York held at Albany beginning April 18th, the following officers were elected: President, Dr. Arthur W. Booth, Elmira; vice-president, Dr. Nathan B. Van Etten, New York; speaker of the House of Delegates, Dr. Eliot Harris, New York; vice-speaker, Dr. George M. Fisher, Utica; secretary, Dr. Edward Livingston Hunt, New York; assistant secretary, Dr. Wilbur Ward, New York; treasurer, Dr. Seth M. Milliken, New York; assistant treasurer, Dr. Charles Gordon Heyd, New York. The following committees were appointed: Public health and medical education, Joshua M. Van Cott, Brooklyn; scientific work, Dr. James N. Vander Veer, Albany; medical economics, Henry Lyle Winter, Cornwall; scientific research, Dr. Frederic E. Sondern, New York; prize essays, Dr. Lucien Howe, Buffalo; delegates to the American Medical Association, Dr. E. Eliot Harris, New York; Dr. Edward Livingston Hunt, New York; Dr. Arthur J. Bedell, Albany; Dr. Richard Kevin, Brooklyn; Dr. Grant Medill, Ogdensburg; Dr. Thomas Chalmers, Queens; alternates, Dr. Allan A. Jones, Buffalo; Dr. Alfred F. Prentice, Dr. Albert A. Ferris, Saratoga; Dr. Lytle, Buffalo; Dr. Paul B. Brooks, Albany; Dr. O. E. Jones, Rochester.

Lecture on Splanchnoptosis.—Dr. Anthony Bassler gave a lecture on splanchnoptosis before the Academy of Medicine of Western Ontario at London, Ontario, on April 18th. The lecture was followed by a clinic on the same subject.

Italian Red Cross Sends Relief Mission to Russia.—The Italian Red Cross has chartered a steamer to transport a mission of relief to the famine stricken population on the lower Volga. It is loaded with cereals, condensed milk, medicines, and clothing and is accompanied by doctors and nurses who will organize canteens capable of distributing two million rations daily.

Aid Asked for Russian Scientists and Educational Institutions.—The work of a group of Russian intellectuals, who are in this country for the purpose of interesting Americans in ameliorating the lot of scientists and educators in Russia, has been warmly endorsed by men of prominence, including Dr. William Darrach, dean of the College of Physicians and Surgeons, and Dr. Henry A. Stimson. An appeal is made for food supplies.

Health Week at the Library for Colored People.—At the 135th Street Branch of the New York Public Library, which is patronized chiefly by the colored people of Harlem, international negro health week was celebrated by exhibitions of books on health and medical subjects, of which a large number were circulated, and public health, nursing, hospital care and similar subjects were illustrated by a large stereomotograph which displayed its slides in the reading room.

The Right Way in Photography.—This is the title of the latest photographic booklet issued by Burroughs Wellcome & Co. It presents a lucid explanation of the various processes in scientific photography and provides information of value to every photographer, whether expert or beginner. Time tables for development in solutions of various dilutions are given with a list of plates classified according to their speeds of development. The cover is a reproduction of one of the many remarkable illustrations from Mr. H. G. Ponting's book *The Great White South* in which he describes his photographic work with Captain Scott's South Polar expedition.

Use of Photostat in Medical Libraries.—The Library Committee of the College of Physicians of Philadelphia, in its annual report for 1921 just issued, calls attention to the fact that the photostat has been in use in the library of the College of Physicians for five years, and that this medical library is the first to use this device. A description of the photostat is given, with the various uses to which it may be put. It covers to a great extent the question of interlibrary loan service and more or less the socalled community service. One fact of great importance is that the danger of loss or damage to books in transportation is eliminated, as with the aid of the photostat accurate copies of articles from bound or unbound books and journals may be obtained. The committee hopes that medical libraries throughout the country will give the matter of the photostat, as a part of their equipment, greater consideration.

Homeopathic Medical Society Holds Annual Meeting.—The seventieth annual meeting of the Homeopathic Medical Society of the State of New York was held in New York on Thursday, April 13th. A resolution was passed providing for a conference with the Homeopathic Medical Societies of New England and the Eastern Atlantic States regarding the formation of an Eastern Homeopathic Association, which would bring together all homeopathic physicians of the East. The society also passed a resolution asking Governor Miller to veto the Knight mental defective bill. Next year's meeting will be held in Utica.

Culture Collection of the Society of American Bacteriologists.—The Society of American Bacteriologists has taken over the collection of cultures which for the past ten years has been maintained at the American Museum of Natural History by Professor C.-E. A. Winslow, and has deposited it at the Army Medical Museum, where facilities have been arranged for its housing and maintenance. The following committee will be in charge: Major G. R. Callender, curator of the Army Medical Museum; Dr. George W. McCoy, director, Hygienic Laboratory, United States Public Health Service; Major H. J. Nichols, Army Medical School; the president and secretary of the society; Dr. J. M. Sherman, Dairy Division, Bureau of Animal Industry, chairman. These and other members of the society in and near Washington will do volunteer work and the research fellow will do part time work in maintaining the collection. No charge will be made for cultures. In making requests, the classification of the society should be followed as far as possible. Mail should be addressed to the Department of Bacteriology, Army Medical Museum, Seventh and B Streets, S. W., Washington, D. C.

New Hospitals Planned for War Veterans.—The proposed program of the War Veterans' Bureau for additional Government hospital construction in various parts of the country for former service men includes a total of 12,000 beds for mental patients. Location of a hospital of 500 beds in the western part of Massachusetts to receive patients from Vermont, New Hampshire and northern Connecticut towns was recommended to replace the hospital now in use at East Norfolk, Mass., while the use of Fort Porter at Buffalo was suggested. Increase in the capacities of the hospitals at Perryville, Md., and Gulfport, Miss., were recommended, together with the construction of a new institution of 500 beds, to be increased later to 1,000 beds, in district No. 7, comprising Ohio, Indiana and Kentucky. Disapproval of the use of the hospital at Maywood, Ill., was expressed and a new hospital of 1,000 beds, to be increased to 1,500 beds, was urged for district No. 8, comprising Michigan, Illinois and Wisconsin. A new hospital of 500 beds, to be increased to 1,000 beds, was urged for district No. 9, comprising Iowa, Missouri, Kansas and Nebraska, to replace the present institution at Knoxville, Ia. A hospital of 500 beds was recommended for district No. 10, comprising Minnesota, North Dakota, South Dakota and Montana. The bureau is awaiting the action of Congress upon pending legislation to provide $16,-000,000 for hospital construction.

A Research Fellowship in Bacteriology.—It is announced by Dr. Victor C. Vaughan, of the National Research Council, in Washington, that the Society of American Bacteriologists at its recent meeting in Philadelphia, appropriated a fund for the support of a Research Fellowship in pure bacteriology. While excellent work is being carried on in many places, nearly all the problems under investigation have as their aim a practical application and there are, therefore, many gaps in our knowledge of fundamental principles. The society, believing it to be the duty of bacteriologists to fill these lacunæ, requires that the line of work to be carried on under its fund must concern a purely scientific and fundamental phase of bacteriology, although a certain latitude of choice will be permitted, conditioned by the previous training and the desires of the research fellow himself.

Applicants for the fellowship must have the degree of B. S., or its equivalent. The successful candidate, through arrangements now being made, will receive academic credit for the work done from a university of recognized standing. One hundred dollars a month will be available for the living expenses of the fellow. Approximately half his time will be devoted to details connected with the society's collection of bacteria, in the Army Medical Museum.

The selection of the research fellow will be in charge of a committee consisting of: Dr. Victor C. Vaughan, National Research Council, chairman; Captain C. S. Butler, Commandant, Naval Medical School; Dr. George W. McCoy, director, Hygienic Laboratory; Dr. John R. Mohler, chief, Bureau of Animal Industry; Mr. L. A. Rogers, president of the Society of American Bacteriologists; Colonel Joseph Siler, Office of the Surgeon General of the Army; Dr. Erwin F. Smith, Bureau of Plant Pathology; Dr. A. Parker Hitchens, Major, Medical Corps, secretary. This committee will have general supervision of the work, approve the problem selected and pass upon the thesis which the fellow will submit as the report of his research.

Applications for and communications concerning the research fellowship should be addressed to the Chairman of the Committee, Dr. Victor C. Vaughan, National Research Council, Washington, D. C.

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Died.

Allen.—In Jersey City, N. J., on Saturday, April 22nd, Dr. Ulamor Allen, aged sixty-eight years.

Brown.—In Trenton, N. J., on Sunday, April 23rd, Dr. David P. Brown, aged forty-five years.

Christine.—In Philadelphia, Pa., on Monday, April 17th, Dr. Gordon M. Christine, aged sixty-five years.

Dunham.—In New York, on Saturday, April 15th, Dr. Edward Kellogg Dunham, aged sixty-two years.

Gould.—In London, England, on Wednesday, April 19th, Sir Alfred Pearce Gould, aged seventy years.

Murphy.—In Hartford, Conn., on Monday, April 17th, Dr. Walter G. Murphy, aged fifty-two years

Patterson.—In New York, on Tuesday, April 18th, Dr. Frank Newhall Patterson, aged sixty-two years.

Sparks.—In Brooklyn, N. Y., on Sunday, April 16th, Dr. Agnes Sparks, aged seventy years.

Tucker.—In Albany, N. Y., on Friday, April 21st, Dr. Willis Gaylord Tucker, aged seventy-two years.

LONDON LETTER.

(*From Our Own Correspondent.*)

LONDON, *February 21, 1922.*

Atmospheric Pollution—Health Insurance—The Progress of Cancer Research—The Disguises of Influenza—Birthrate, Deathrate, and Infant Mortality in England and Wales in 1921—Annual Congress of the Royal Institute of Public Health—Inflammatory Strictures of the Rectum.

There is a unanimity of opinion that a clean atmosphere is healthier than one overcharged with smoke or polluted with noxious vapors. So far, however, as the direct influence of atmospheric pollution on tuberculosis is concerned, we have no definite data on which to base an opinion. While the disease is assuredly more prevalent in manufacturing than in agricultural districts, other influences beside atmospheric conditions enter into the question, and therefore the marked prevalence of the disease cannot with certainty be ascribed to this cause. The situation is somewhat different, however, with respect to other forms of respiratory disease, as evidence drawn from statistics shows that there is an intimate relationship between the number of deaths due to pulmonary maladies generally and the intensity and duration of fogs surcharged with smoke and dirt. However, although evidence is not clear except in the case of tuberculous silicosis, and perhaps of some bronchial affections, that there is any close connection between the occurrence of other respiratory diseases and phthisis, it is obvious that a pure or fairly pure atmosphere is more conducive to good health than a dirty one; consequently, any action taken to effect this end cannot fail to meet with the approval of all interested in health matters.

The report just issued by the Departmental Committee appointed in 1914 to consider the question, and whose work was suspended during the war, is most timely. An interim report was published in 1920 and is included in the present report. In the interim report the committee pointed out the damage caused by smoke and other noxious vapors, and in the report issued recently they state that the conclusions then reached have been strengthened by further evidence. The domestic fireplace in Great Britain is the chief offender as regards air pollution, as it is estimated that approximately two and a half million tons of fuel in the form of dust escape annually into the air from such fireplaces and half a million tons from industrial chimneys; and that in Manchester the increased cost of household washing alone on account of smoke is over £290,000 a year. London has always been regarded as the smoky city of the British Isles, but this is by no means the case. For instance, in Birmingham for the year ending March 31, 1921, over fifty-four tons of solids were on an average deposited monthly to the square mile; in London rather over twenty-five tons, while in Malvern, a small town in Worcestershire, the deposit was only just over six tons. The committee believes that inasmuch as an impure atmosphere is harmful to health and is indicative of wasted fuel and energy, steps should be taken to prevent it. The report points out that action in this direction was taken many years ago, as proclamations were issued in the time of Edward I and Elizabeth forbidding the use of coal in London when parliament was sitting. The present law as regards the smoke nuisance is stated, and the point is emphasized that the law is adequate if it were enforced. Definite recommendations are made that the Minister of Health should be given power to act wherever any local authority refuses to perform his duty, and that he should have power to transfer to the councils of counties and county boroughs the duty which now lies with local sanitary authorities in enforcing the law. The report shows that smoke abatement is possible of attainment and it is to be hoped that their recommendations will be made law and enforced as soon as possible.

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In the session of parliament opened on February 7, 1922, the Minister of Health, Sir Alfred Mond, introduced a bill increasing the rate of contribution to national health insurance by one halfpenny a week each from employer and employed. An extension of benefit is contemplated as regards dental treatment.

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The announcement made recently that Lord Atholstan and Sir William Veno had each offered large sums to aid cancer research has revived interest in the problem of cancer and especially among laymen. The ordinary individual is astonishingly ignorant as to malignant disease. There are two outstanding views with respect to its causation, the parasitic and the biological. Those who hold the former view believe that malignant tumors are caused by an organism somewhat analogous to that which causes tuberculosis and syphilis. The biological theory of its causation is more complex and to understand the evolution of living organisms must be considered. It proceeds on the assumption that in the first instance, all animals were unicellular and that their main object was to reproduce incessantly. As time went on these single cells massed into groups and took upon themselves special functions. The bodies of the higher animals were built up after this fashion and ultimately that of man, but in the depths of every cell, however highly specialized, there exists the hereditary tendency to divide and to go on dividing. If conditions are unfavorable, for example, in chronic irritation, the cell may revert to type, that is, revert to its reproducing function and continue reproducing without regard to the wellbeing of the body as a whole. The other tissues of the body, however, put up a strong defense against the cells which have forgotten the teachings of ages, and it should always be borne in mind that the healthy tissues are the allies of the physician and surgeon in the fight against the spread of cancer. The secret of success in the treatment of cancer is early diagnosis.

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The number of cases of influenza during the week just ended has shown a marked decline in all parts of Great Britain, and medical authorities believe that anything like a recrudescence is quite improbable. Recent experience, however, has revealed the fact that influenza masquerades under symptoms of other diseases. In London, for example, a number of persons supposed to be suffering from gastritis were found on examination to be really the victims of influenza. This simulation is not so peculiar as the similarity of influenza in some of its features to scarlet fever, since gastrointestinal disorders are a frequent accompaniment or symptom of the disease. Influenza usually finds out the weak spots. Its similarity to scarlet fever is more remarkable, especially as several cases in Manchester at first had all the appearance of this affection including a rash. The question was discussed at a recent meeting of the Manchester Medical Society. It is said that in Sheffield many cases reported at the outset to be lumbago were discovered on examination to be influenza.

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Provisional figures of the birth rate, death rate, and infant mortality for England and Wales during the year 1921 have just been published. The birth rate in 1,000 of the total population was 22.4; the death rate in 1,000 of the population, crude rate, was 12.1, and the infant mortality, deaths under one year in 1,000 births, was 83. For the ninety-six great towns, including London, population exceeding 50,000 at the census of 1911, the corresponding figures were 23.5, 12.3, and 87. In 146 smaller towns, population from 20,000 to 50,000 at the census of 1911, the birth rate was 22.7, the death rate 4.3 and the infantile death rate 84. The figures for London only were 22.8, 12.4 and 79 respectively. The death rate for England and Wales is the lowest on record for the country as a whole, and the infant mortality is the lowest on record with the exception of the rate in 1920. The birth rate is the lowest recorded for the whole country except in the war years 1915-1919.

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The annual congress of the Royal Institute of Public Health will be held at Plymouth from May 31st to June 5th, under the presidency of the Earl of Fortesque. In addition to conferences on various matters of importance to public authorities, the work of the congress will be conducted in four sections as follows: Section 1: State medicine and municipal hygiene. Section 2: Naval, military and air medicine. Section 3: Bacteriology and biochemistry. Section 4: Women and public health. The Harben Lectures will be delivered during the meeting by Dr. T. Madsen, director of the State Serum Institute, Copenhagen.

* * *

A meeting of the Medical Society of London, held in London on February 13th, under the presidency of Mr. James Berry, F. R. C. S., a discussion on the subject of inflammatory strictures of the rectum took place. The discussion was opened by Prof. Henri Hartmann, of Paris, who spoke in English. The lecturer, in introducing the subject, said that he had had eighty-six cases of this condition, fifty-nine having been in women, thirty-six in men. He pointed out that inflammatory strictures of the rectum must be fairly rare, as eighty-six cases were all that his long practice had yielded. All statistics on the subject gave a preponderance of cases among women, but a wrong idea of general prevalence among females was due to many of the returns from hospitals specially devoted to women's diseases, including venereal disease. His own numbers taken from a general surgical clinic did not show a large disproportion, that is, fifty to thirty-six. Syphilis existed in thirty of his cases, or thirty-five per cent. Among other causes were tuberculosis, pederasty and chronic inflammation of the uterus, but he did not think that the lymphatics in the neighborhood played a part, or only in exceptional ways. Often there was gonorrheal infection which affected the genital and rectal regions concurrently. After closely describing these strictures, Professor Hartmann said that antisyphilitic treatment had no effect, even in syphilis patients. The more usual treatment was by dilatation but it must be done with gentleness. When this was done each bougie should be left *in situ* a few seconds only. After the proper sized bougie for the case had been reached the treatment should be continued once a week. When proctitis was present the condition was sometimes made worse by dilatation. He had occasionally obtained permanent cures when the lesions were limited to the rectum. It was his former custom to use drainage tubes, but more recently he made a counter opening on the posterior part of the ischiorectal fossa and used two drainage tubes, with satisfying results. Twice he had performed abdominal peritoneal excision on account of the stricture having reached the inferior half of the pelvic colon. In these he had one cure, the other patient died. His last twenty-five operations had been attended by no fatalities. Of seventeen colostomies he had had fifteen cures. By a careful combination of various methods, great relief could be brought to many of these patients afflicted with inflammatory stricture.

In discussing the lecture Mr. P. Lockhart-Mummery said he had now been performing internal proctectomy for fifteen years and had found it a very satisfactory operation in suitable cases. He thought a number of cases of inflammatory stricture in women were a sequel to a difficult, protracted, even neglected, second stage of labor. He was not inclined to place in the syphilitic category so many cases as the professor did. Most of the cases he regarded as streptococcal. Mr. Herbert Spencer did not agree with Mr. Mummery's remarks as to stricture following difficult labor.

Sir Charles Gordon Watson did not think many of the cases of inflammatory stricture were associated with syphilis. Many of the subjects of this disease, especially women, gave a history of gonorrhea. Sir W. Arbuthnot Lane said that most of the strictures of the rectum had been produced by the surgeon, and they had been difficult to treat. A few, almost all of them in females, were caused by gonorrhea. Strictures which had caused him some trouble were those consequent on ulcerative colitis. Prof. Hartmann in reply said that he had never seen inflammatory stricture as a sequel to difficult labor; indeed most of the cases were in women who had never experienced full term labor. Gonorrhea, he thought, played an important rôle in the production of these strictures. There were two categories of strictures: 1, Those with little ulceration or suppuration, and 2, those with widespread lesions, with vegetations, etc. These last were syphilitic, gonorrheal or tuberculous. Treatment by extirpation was the ideal method, but it could only be done in early cases and when there was healthy mucous membrane above the ulcer.

Book Reviews

THE VENEREAL CLINIC

The Venereal Clinic. The Diagnosis, Treatment, and Prevention of Syphilis and Gonorrhea. A Handbook of Venereal Disease in Relation to the Individual and the Community. By Several Writers. Edited by Ernest E. T. Clarkson, M. A. (Cantab.), M. R. C. S., L. R. C. P., Chief Clinical Assistant, Urogenital Department (Males), London Hospital; Late Demonstrator in Human Anatomy in the University of Cambridge. With an Introduction by Sir Squire Sprigge, M. D. Illustrated with Colored and Other Plates. London: John Bale, Sons & Danielsson, Ltd., 1922. Pp. 456.

This book is extremely practical and is written by men with an intimate knowledge of the various branches of the subject which they discuss. The treatment of all forms of venereal disease is carefully considered and the part of the book dealing with treatment may be warmly recommended to the medical profession. However, treatment does not vary to any great extent in any country, and the most engrossing portion of the work is that relating to the sociological and administrative aspects of the question and particularly to the prevention of venereal disease, which was written by Dr. Clarkson. This review will therefore be confined to a consideration of the chapter which deals with the prevention of venereal disease.

The author discusses the matter from the following points of view: 1, religious and ethical; 2, educational; 3, medical and physical preventive measures; 4, notification of venereal disease. With regard to the influence that religion exerts in preventing promiscuous sexual intercourse practically it is a particularly weak one. So far as education is concerned attention is drawn to the fact that in Great Britain, although venereal disease is deplorably prevalent, no compulsion is laid upon the students by the examining bodies to undergo a course of instruction as to the diagnosis and treatment of these diseases. Neither is the nurse adequately educated in relation to venereal disease. Both of these omissions the author suggests should be rectified as quickly as possible. In Great Britain great differences of opinions exist with respect to the kind of medical and physical preventive measures which should be employed. The controversy hinges especially around the question of immediate selfdisinfection or quick disinfection. Dr. Clarkson is no partisan and presents the more salient points in dispute in a judicially dispassionate manner, laying down the following points as conducive to forming an opinion.

In the first instance, he warns against the acceptance of statistics at their face value, and goes on to say that if the opponents of immediate selfdisinfection oppose the practice of this method on ethical grounds by reason of its being conducive to immorality, they have neither reason nor right to concern themselves with the question as to whether it is physically efficacious or otherwise. The advocacy of immediate selfdisinfection is in no sense synonymous with the issuing of packets to the community. Those who oppose immediate selfdisinfection on ethical grounds should satisfy themselves as to whether the carrying of a preventive packet or materials in the pocket spells a greater temptation to the individual than his bearing in his mind the statement that early preventive treatment is stated to be more efficacious than immediate selfdisinfection. It may be laid down as a social axiom that any practice which tends to increase sex promiscuity is evil for the community as being disastrous to the welfare of its constituent social units as represented by the family. And lastly, that neither prophylaxis nor early treatment nor any other medical means of combating venereal disease should be our sole ultimate aim, which should be the reduction of promiscuous sexual intercourse. The author holds the scales fairly evenly between those who uphold immediate selfdisinfection and those who oppose it, with perhaps a slight leaning to the former method. The case for and the case against are argued with great impartiality, and the result is to clear up a good many misconceptions which have existed and to make the whole situation more comprehensible. The book has a discriminating introduction by Sir Squire Sprigge, editor of the *Lancet*, in which he points out that the fact that a complete section of the book is devoted to a consideration of gonorrhea in the female shows that one of the outstanding lessons of recent venereal control has been learned. The illustrations are adequate and good.

PULMONARY TUBERCULOSIS

Pulmonary Tuberculosis. Its Etiology and Treatment. A Record of Twenty-two Years' Observation and Work in Open Air Sanatoria. By David C. Muthu, M. D., M. R. C. S., L. R. C. P., Associate of King's College, London; Medical Superintendent, Mendip Hills Sanatorium, Wells, Somerset. New York: William Wood & Co., 1922. Pp. viii-381.

A reading of the preface of Dr. Muthu's book leads one to expect a stimulating and valuable exposition of the modern views on tuberculosis. Many will agree that we have lingered long enough at the milestone of bacteriology, that more attention should be paid to the chemical and biological actions within the body, and that we should adjust our angle of vision and study life's processes from the social, economic and psychological aspects. But, unfortunately, Dr. Muthu loses his way as he passes beyond the milestone of bacteriology.

We can follow him when he minimizes the contagiousness of tuberculosis in adults, when he recalls the rarity of conjugal tuberculosis, when he points out that the fall in the rate of tuberculosis was greater before the Koch bacillus was discovered than afterward, when active preventive measures were introduced, and when he deprecates the value of isolation of tuberculosis patients in hospitals and sanatoria as a means of checking the spread of the disease. His explanation of these phenomena, however, based on an uncritical survey of the literature, in which he marshals all of the articles in favor of his thesis, and overlooks the others, is hardly worth discussing at this present date and age. To all intents and purposes he returns to the doctrine of spontaneous generation in proposing the following thesis:

1. That microorganisms arise for the most part from within from the altered condition of the blood. 2. That this altered state of the blood has been brought about by a vicious environment—nutritional, metabolic, and hygienic—causing the saprophytes to take on pathogenic properties which make for disease processes. 3. That in turn these pathogenic organisms, by a more favorable environment, can become saprophytes and harmless, which coincides with a return of health. 4. That Béchamp explained these phenomena by pointing out that both tissues and blood cells on the one hand and microbes on the other are one and the same, only in altered forms, brought on by man's changed environmental conditions. One may at times arrive at correct conclusions from incorrect premises. So it is with Dr. Muthu. The chapters on the treatment and prophylaxis contain much that is good. In addition to the usual sanatorium measures the author employs graduated exercise as a routine measure following a preliminary rest period. Occupation therapy is intelligently prescribed and often combined with physical exercise. The use of continuous inhalations of mixtures of volatile oils, formaldehyde and guaiacol as practised at Mendip Hills Sanatorium, seems less rational.

Probably the best part of the book is the discussion on preventive measures. Social, economic and psychological causes are looked upon as the great breeders of tuberculosis. In addition to the diagnosis and sanatorium treatment of early cases, our whole efforts should be devoted to the improvement of the economic conditions of the masses rather than to the conventional but futile attack on the ubiquitous tubercle bacillus. The book is not to be recommended to the uncritical reader, but for the student it may, as the author hopes, stimulate thought, challenge inquiry, and broaden his horizon in the study of tuberculosis.

THE TUBERCULOSIS PROBLEM

Les Bases Actuelles du Probleme de la Tuberculose. Par Fernand Bezancon, Professeur a la Faculté de Médecin; Membre de l'Academie de Médecine; Membre de la Commission permanente de la Tuberculose. Paris: Gauthier-Villars et Cie, Editeurs, 1922. Pp. vi-196.

This book is one of a series on Science and Civilization written for the educated lay public. Prof. Bezancon has written a very readable and comprehensive book on tuberculosis, which presents the subject in a clear and scientific manner, in sharp contrast to so many of the popular scientific publications. He discusses the evolution of our knowledge of tuberculosis, the bacteriology, the problems of contagion and infection, the important manifestations of tuberculosis in the adult, as well as diagnosis, therapeusis and prophylaxis. At times the discussion becomes a little too technical for the nonmedical reader. Some may question the emphasis which he places on contagion as the chief cause for familial tuberculosis and the importance which he places on hospitals and sanatoria as the means of isolating the tuberculous and thus limiting the spread of the disease.

The book can be recommended to physicians, as well as to the laity, as a brief and comprehensive summary of our present knowledge of tuberculosis.

TUMORS.

Neoplastic Diseases. A Treatise on Tumors. By James Ewing, M. D., Sc. D., Professor of Pathology at Cornell University Medical College. Second Edition, Revised and Enlarged. With Five Hundred and Fourteen Illustrations. Philadelphia and London: W. B. Saunders Company, 1922. Pp. 1054.

The enthusiastic reception with which the first edition of this fine work was greeted by the medical profession undoubtedly again will be accorded to this second and revised edition. The author has made an enviable reputation as an authority on tumors and needs no commendation. He has produced a work which is perhaps the most practical and useful that has yet appeared on this subject.

His treatment of tumors in general is well known to readers of the literature on pathology. In this work he has endeavored, with considerable success, to analyze the numerous etiological factors which meet in such diverse fashions in the inception of tumors, to emphasize the general dependence of the clinical course upon the histological structure, to trace the histogenesis to the last degree, impressing at the same time its importance when known, and enumerating and contrasting the more striking clinical features which are often highly characteristic of different tumors.

The chapters on bone tumors and on neurofibromatosis have been largely rewritten, and it is evident that few portions of the work have remained unchanged. Thirty-three new illustrations have been added, making a total of five hundred and fourteen. The result of these labors is a monumental work, characteristic of the ability and reputation of the author in his chosen field.

X RAY TREATMENT OF CARCINOMA.

Zur Therapie des Karzinoms mit Röntgenstrahlen. Vorlesungen über die physikalischen Grundlagen der Tiefentherapie. Von Prof. Dr. Fr. Dessauer, Direktor des Instituts für Physikalische Grundlagen der Medizin an der Universitat Frankfurt a.M. Mit 30 Textfiguren. Dresden und Leipzig: Verlag von Theodor Steinkopff, 1922. Pp. 70.

A monograph in lecture form outlining the physical conditions involved in deep x ray therapy. This is attempted in four short lectures, and the author manages to combine conciseness with simplicity. Here is unfolded the precision with which the physicist has attempted to apply his specialty to a biological problem. To one interested in the subject from the point of view of practice little encouragement is to be derived from a reading of these lectures. The physical conditions surrounding each attempted treatment must be individually computed and can be formulated only by one most thoroughly trained in x ray physics. To the medical profession in America here is yet another instance of German science showing the way. The professor eloquently and hopefully calls attention to the importance of physics to medicine pointing to his unique chair in the University of Frankfurt a.M. as evidence thereof. Following the lectures is an appendix in which is abstracted all the author's published papers from 1905 to 1921 dealing with problems of deep x ray therapy. Have we here a publication serving as a prospectus inviting all to come to Germany and learn?

CARDIOVASCULAR DISEASES.

The Clinical Study of the Early Symptoms and Treatment of Circulatory Disease in General Practice. By R. M. Wilson, M.B., Ch.B., Late Assistant to Sir James Mackenzie Under Medical Research Committee; Late Cardiologist, War Office Trench Fever Committee; Consulting Physician, Ministry of Pensions. With a Foreword by Sir James Mackenzie, M.D., F.R.S., F.R.C.P. The Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton, 1921. Pp. xvi-245.

It is a truism that the general practitioner knows little of the more obscure diseases of the heart. It is also a truism that Sir James Mackenzie has revolutionized the study of cardiology, not only by suggesting and bringing out methods to diagnose with greater accuracy many of the heart affections but by pointing out that in order to treat a case scientifically and intelligently the relations of the symptoms to the disease must be understood. Indeed, in heart disorders, he pursues the same course as in the treatment of other diseases, namely, to prevent their development. Certain gross signs are palpable to the comparatively untrained medical man, when the disease has advanced, but the object of successful treatment is to be able to detect early symptoms and prevent the malady from reaching a serious stage.

The book under review is by Sir James Mackenzie's chief disciple, who may not inaptly be termed his Huxley, as he propagates the views of his teacher in much the same way as Huxley propagated and explained the views of Darwin. Dr. Wilson commences the introduction to his book by stating a fact which in these days is often overlooked, that what is true of the laboratory is not necessarily true of the sickroom. Clinical methods are of as much importance as laboratory investigations, perhaps more so, and to obtain the best results, one method must act in cooperation with or as an adjunct to the others and not be expected to solve the problem by itself. A living body, unlike an experiment, always reacts to its surroundings, and so escapes from being overwhelmed by them. This truth forms the basic argument of the book and is elaborated in an instructive and interesting manner.

On account of the limitations of space only some of the most pertinent points will be dealt with. The first chapter discusses the nature of exhaustion, in which the author states his agreement with Mackenzie that exhaustion is not a symptom of cardiac weakness but is a vasomotor phenomenon, and that breathlessness is a cardiac phenomenon. Exhaustion may and not infrequently does proceed from a mechanical cause, in women, for instance, not infrequently from a perineal tear. Again a marriage without love may cause a psychic inhibition. The mechanism of exhaustion is described as well as the determining causes of exhaustion and then the diagnostic significance of the condition is dwelt on at length. The chapter on the pulse rate as a symptom is especially worthy of close attention and the following conclusions are arrived at, that in attempting to derive information from the pulse, other circumstances must be carefully weighed and possible errors excluded. The exhausted patient with a slow pulse must be carefully examined before the slow pulse can be accepted as pointing definitely to a permanent visceral disturbance. Tachycardias, too, must be read in the light of temperature and blood pressure and general activity. In the active, they point almost unmistakably to the presence of a toxic agent. The slow pulse of typhoid belongs in a class by itself but there is no space here to describe Dr. Wilson's views thereon.

A chapter is devoted to breathlessness and another to cyanosis, the latter being of particular interest. Another chapter dealing with the recognition of the types of infection is certainly one of the most important chapters of the book. Other chapters deal with The Relationship of Pulse and Temperature; The Symptoms of the Patient's Sensations; The Significance of Hyperalgesia; The Sensation of Cardiac Pain; Headache as a Sensation; Observations on Blood Pressure; The Infections Which Attack the Heart; The Earliest Symptoms of Heart Failure and finally Lines of Treatment Founded on Early Signs and Symptoms.

The whole work is based on original views as to the cause of heart affections and disability. The author has attempted to differentiate between the effects of disease and the reactions of the body thereto. No one will deny, of course, that knowledge of the diseases and disorders of the heart is very imperfect. There is much to be done in this field and Sir James Mackenzie has led the way to a new conception of disease and the mode of preventing it. Dr. Wilson's book may be commended to the notice of American medical readers. It is also an excellent piece of book making and is adequately illustrated.

PSYCHOLOGY OF PREADOLESCENCE.

The Soul of a Child. By Edwin Björkman. New York: Alfred A. Knopf, 1922. Pp. 322.

Case histories are always absorbing. In Mr. Björkman's book we have a great deal more than an authentic case history. Physicians will recognize at once the type of patient produced by the environment so inimitably described by the author. The story starts with Keith Wellander's earliest recollections. All the petty details of a dissatisfied household, with the evasions, half hints, and neurotic secrecy, spur him on to the waspish precocity found so often in the only child. From the family circle that will not satisfy his questions, Keith turns more and more within himself and the stages of neurotic introversion are subtly indicated.

The mother is hysterical, and is swamped by periodical waves of depression. The father is occupied with some unknown business, that Keith discovers to be of menial nature, although the family tries to cast a glamor over it. His father's fulfillment of Keith's imago vacillates interestingly. He finds he is not so all powerful as Keith had thought him, but how well he carries out his duties, and how just and upright he is in regard to his employees. The father is ludicrously subservient to his old mother, yet how fine he is to pay her such courtesy. The father's brother is arrested for embezzlement, yet how nobly he recovers his selfcontrol on Keith's account. The relation of Keith to the mother is more typical. He is tied to her apron strings for many years, yet with a growing resentment. He never breaks away entirely. He is swamped by a sickening pity for her, an inertia that forbids the break. The recollection of his grandmother's power over his father makes his clinging natural.

Like *A Young Girl's Diary* this book brings an important contribution to preadolescent thought life. This boy also has to explore the recesses of sex taboo unaided. The perversity and misinformation accessible to his group of playmates are approached in a spirit of psychic purity that is rapidly tarnished by adult bungling. The so frequent clouding of ambition and failure in school work is inevitable here as well, during the year or two of intense conflict at twelve or therabouts.

In the boyhood history of this lad, everything that is pernicious in child training has taken place. For want of space the boy sleeps in his parents' room until he is fully grown. The parents seem to have considered him deaf, dumb and blind all through his life, except when a spark of interest would come to the surface. The spark would be fanned destructively to smouldering inversion of the parents' unwillingness to face their responsibilities toward him.

It will be interesting to see how many parent readers of this book will remain blind to its bearing on immediate problems. Yet no matter what the advantages of each group, there is no lesson that does not apply very closely. May it open the eyes of the reading public, as it has done in the medical world, to the shortcomings of parents, and the effect upon innocent victims who have no choice but to develop into neurotics.

RECENT CONTRIBUTIONS TO ANTHROPOLOGICAL LITERATURE

Source Book in Anthropology. By A. L. Kroeber and T. T. Waterman. Berkeley: University of California Press, 1920. Pp. 565.

On the Trail of the Pigmies. An Anthropological Exploration under the Cooperation of the American Museum of Natural History and American Universities. By Dr. Leonard John Vanden Bergh, J. D., LL. B. Photographic work under the guidance of Dr. George Burbank Shattuck, Formerly Professor of Geology at Johns Hopkins and Vassar Universities. Foreword by Robert H. Lowes, Associate Curator, Department of Anthropology, American Museum of Natural History and Lecturer in Anthropology, Columbia University. New York: James A. McCann Company, 1921. Pp. xiv-264.

Psychology and Folklore. By R. R. Marett, M. A., D.Sc., Fellow and Tutor of Exeter College, Oxford; University Reader in Social Anthropology. New York: The Macmillan Company, 1920. Pp. ix-275.

It is increasingly evident that some understanding of anthropology is not only desirable, but also essential to the physician if he is to keep up with the trend of everyday progress. Evolution, exogamy, cultural types are all terms in such constant use that the greater our familiarity with them and their ramifications the more interest we find in life.

A little book that combines the most pertinent selections of anthropological literature in a form easily read and of vast use for reference to the scientist, is the *Source Book in Anthropology* compiled by A. L. Kroeber and T. T. Waterman. Evolution, heredity and race are studied with the aid of the best authorities, then the civilizations and the criteria of stages of civilization surveyed. Herodotus, Charles Darwin, Huxley, Hrdlçka, Tylor, Galton, Boas, Karl Pearson, are a few of the noted workers from whose writings selections have been made.

Further illustration of many of the theories of primitive culture is offered in Dr. Vanden Bergh's spirited book, *On the Trail of the Pigmies.* For ten years the author was a missionary in Africa and he studied this rich anthropological field with the zest of a born scientist. Observations on the primitive life and medical beliefs, rites such as circumcision ceremonies and material concerning many interesting savage customs met with universally among primitives and not infrequently in the mentally unbalanced, are recorded by means of moving pictures. Numerous exhibitions of these pictures have been given in the last year. The permanent record that he has obtained is unique. The little known character of the pigmy and of primitive man in general in Africa is illuminated by this intrepid explorer.

Finally we come to a noteworthy series of essays [*Psychology and Folklore,* Marett], publications of speeches and lectures by a distinguished anthropologist. Folklore and anthropology are studied from the viewpoint of psychology. We do not find here the mass of data, comparative and otherwise, that makes a ponderous treatise out of anthropological research. But with a vast background of such material Dr. Marett presents such fundamental theses as the nature of folklore, the relation between war and savagery, the interpretation of survivals, the primitive medicine man, anthropology and university education.

A number of these essays were delivered as presidential addresses before the Folklore Society in England during the war. The attitude of the broad-minded scientist who seeks causes, not on a petty, personal scale, but with a profound knowledge of human nature from its most primitive to its most advanced representatives is here strikingly illustrated.

A brief argument precedes each essay, a point of departure, as it were, for the author's vast treasure house of information. We delve with him into a region full of life and color. All in all, a collection of writings as fundamental as they are fascinating, worthy of adorning the book shelf of any thinker.

BEGGARS' GOLD.

Beggars' Gold. By Ernest Poole. New York: The MacMillan Company, 1921. Pp. 234.

"Beggars sitting on bags of gold" is what we humans, and especially our children, all are, according to Ernest Poole in this latest story of present day American life. In other words, the unlimited moral and spiritual possibilities of human nature, if they can only be released, have the power to change us from children and weaklings to moral giants.

Peter Wells, the hero of *Beggars' Gold,* came from a little New England village to New York city to devote his life to what he believed to be his mission—teaching in the public schools. Underneath his crude, awkward exterior burned unquenchably a fierce love of beauty and romance, which, through his having heard in childhood a talk by a missionary, had concentrated itself upon China as the most interesting and thrilling of all lands. So when Moon Chao, a tiny Chinese orphan, and Katherine Blake, a teacher and the daughter of an engineer who had devoted all his energies to the betterment of China, came at the same time into Peter's life, his passion to live and work in China was augmented by a like zeal on the part of these two. But, although Peter and Kate were married and adopted temporarily Moon Chao, this goal of the East was destined to recede distantly and at times almost to be obliterated by the struggle of the young couple against the exigencies of professional obstacles, illness, the bringing up of their own child, and finally the hard times of the Great War. To cap the climax, Peter, in his passion for truth and sincerity, was persuaded to make an address at a meeting of radicals, which was interpreted as seditious by a few unfriendly coworkers, who were able finally to bring about his humiliation and expulsion. Finally Peter and Kate, their natures developed and enriched by the long struggle, can realize their golden dream.

For some reason this picture of present day American life by Mr. Poole lacks the vividness and convincing quality of most of his former works. Perhaps this is in part due to the fact that the characterizations seem rather vaguely and indefinitely drawn. We have the feeling that the author is depicting and developing his personages to substantiate a theory, to point a moral, rather than letting them live out their own lives. Such an effect is probably inevitable in a book in which we have the consciousness that the writer sets out so definitely to make a point as does Poole in *Beggars' Gold*. Yet, in spite of all this effort, the reader is rather vague as to just what this point is. Why, when Peter and Kate seem to realize so clearly that their own country, America, so sorely needs the help and support of sincere, broadminded and loyal spirits in a time of moral dearth and depression, do they rush off to China to satisfy their desire for service? Surely neither the attainment of a long cherished ideal, nor the humiliation of Peter's expulsion from school by a few narrowminded fanatics, is sufficient cause for such a desertion in time of need by two who are represented as desiring above all else to devote their lives to the highest form of service.

The book does have a value, however, in its support of the preservation of broadmindedness and idealism in times of national crisis, and its emphasis of the fact that the chief avenues for social and national betterment are education and the schools.

PRIZE STORIES.

O. Henry Memorial Award. Prize Stories of 1921. Chosen by The Society of Arts and Sciences. Garden City: Doubleday, Page & Co., 1922. Pp. 312.

Although the sixteen stories chosen by the society for publication this year cover a wide range of subject and show great variety of treatment, not one is exceptional as a literary product. Blanche Colton Williams, in her introduction to the volume, states that she feels that the low standard of present day magazine fiction may be due in part at least to the harmful editorial policies of encouraging padding, or the reverse, of socalled editorial surgery.

SPIRIT OF THE EAST.

The Hidden Force. A Story of Modern Java. By Louis Couperus. Translated by Alexander Teixeira de Mattos. New York: Dodd, Mead & Company, 1921. Pp. 302.

The sinister thread of emotion weaves as a shuttle back and forth to link the Dutch colonist to conquered Java. In the welding of the native lives by white marriages, the gradual violation of tradition and the final rule by force imposed upon the inhabitants, the story of many foreign occupations is told. A picture of Dutch life in Java, forceful and in some respects as embittered as Claude Farrère's descriptions of Indo China, is given here with tropical witchery and mystery to lend it spice.

A GOOD MYSTERY STORY.

Within Four Walls. By Edith Baulsir. New York: The Century Company, 1921. Pp. vi-325.

A first class detective story of the conventional type, the mystery of which is skillfully developed without a chance of the reader guessing it till the very end. It contains a "cry in the night," a villainous father and an adorable daughter, a murder, a bungling detective, a long suffering suspect whose noble character is finally revealed to the world, and a very charming and clever young hero in love, of course with the adorable daughter. But to tell more would give away the plot. The story is excellent entertainment for a rainy evening at home.

Medicoliterary Notes.

Havelock Ellis has in *The Forum* for April an article entitled The Measurement of Civilization, in which are discussed the methods of the Italian sociologist and statistician, Alfred Niceforo, author of *Les indices numeriques de la civilization et du progrès*. The writer also quotes Professor William McDougall's conception of civilization as shown in his *Lowell's Lectures,* Is America Safe for Democracy?

* * *

"There are three motives for human action: 1, the feeling that our intercourse with other human beings evokes; 2, imitation, influence, hypnosis; 3, rational thought. Of a million acts caused by the first two groups of motives, there will be not more than one due to rational thought. . . . The same truth applies to groups of men, that is, to social actions." (*Tolstoi's Diary,* 1903.)

* * *

An anonymous author, reputed to belong to high circles in Germany, has just published a sensational book called *Germany's Tragedy*. One chapter of this is a character study of William II in which the writer represents the former Emperor as always having shown many unmistakable signs of serious mental disease. This chapter is reprinted in part in *The Living Age* for April.

* * *

Maria Chapdelaine, by Louis Hémon, and *Memoirs of a Midget*, by Walter de la Mare, are two excellent recent works of fiction. *Maria Chapdelaine* is an exquisitely told, wholesome story of the Canadian

North woods, coming as a real rest and relief after a superfluity of "problem stuff." It is available in the French text for those who prefer to read it in the original. Walter de la Mare, author of *Memoirs of a Midget,* is already well known as a British poet. This recent novel of his is not only an extraordinarily artistic and original piece of fiction writing, but also a remarkable study in psychology. So convincing is his presentation of "Miss Midget's" inner life that the enthralled reader is constantly asking himself if she were not a "really real" person.

* * *

The English *Cornhill Magazine* for January contains a series of delightful sketches called Reminiscences of the Yorkshire Moorland, by a Country Doctor. The writer introduces himself as follows: "It has been said that the parson sees a man at his best, that the lawyer sees him at his worst, and that only the doctor sees him as he really is. If that is the truth, as I think it is, I have only myself to thank if I cannot give a true picture of the life and character of the Yorkshire Moorlander."

* * *

Traité de Metapsychique is the title of a volume of more than eight hundred pages recently submitted by its author, Professor Charles Richet, to the Paris Academy of Sciences. This is the first time in the history of the Academy that the "occult sciences" have been officially discussed. The book is dedicated to Sir William Crookes and Frederick Myers, the latter one of the founders of the Society for Psychical Research.

* * *

Sir Arthur Pearson, the blind philanthropist, whose recent death has been mourned by the whole of England, is the subject of an interesting article in *The Cornhill Magazine* for February. Pearson, who was afflicted with blindness in the midst of a successful career, devoted the rest of his life to helping the blind in less fortunate circumstances than himself. The article describes his work at St. Dunstan's and is reprinted in *The Living Age* for March 25th.

* * *

The Scientific Monthly for February contains two articles of interest on public health problems. One is by William A. McCall and Bronson L. Huestis, both of Columbia University, and is entitled Mental and Physical Effects of Fresh Air. Emphasis is laid upon the subject of open air schools. The writers consider their value as still an open question.

Dr. J. Howard Beard, of the University of Illinois, is the writer of the second article, The Progress of Public Health Work. The development of the public health idea and its application is traced from the Hebrews, who originated it and made hygiene a part of religion, through the Middle Ages, when the Crusades and other wars led to worldwide epidemics. At this time syphilis appeared, and bubonic plague, ergotism, scurvy, influenza and leprosy destroyed millions. The writer concludes with a discussion of modern theories and methods of sanitation—insulation, group practice, maternal and child welfare work, rural and industrial hygiene, and health instruction in schools.

New Publications Received.

LE SYMPATHIQUE ET LES SYSTEMES ASSOCIES. Par A. C. Guillaume. Preface du Pierre Marie. Paris: Masson et Cie, 1921. Pp. xxiv-395.

THE VITAMINES. By H. C. Sherman and S. L. Smith. New York: The Chemical Catalog Company, Inc, 1922. Pp. iii-273.

PSYCHOANALYSIS. By R. H. Hingley, B. A., Research Student at Edinburgh University. New York: Dodd, Mead & Co., 1922. Pp. vii-190.

LE BACTERIOPHAGE, SON ROLE DANS L'IMMUNITE. Monographies de L'Institut Pasteur. F. D'Herelle. Paris: Masson et Cie, 1921. Pp. iii-227.

TRAVAUX NEUROLOGIQUES DE GUERRE. Par Georges Guillain et J. A. Barre. Preface du Professeur Pierre Marie. Paris: Masson et Cie, 1920. Pp. xii-463.

THE PSYCHIC LIFE OF INSECTS. By E. L. Bouvier. Translated by L. O. Howard, M.D., Ph.D. Illustrated. New York: The Century Company, 1922. Pp. xvi-377.

NUTRITION AND GROWTH IN CHILDREN. By William R. P. Emerson, A. B., M. D. Illustrated. New York and London: D. Appleton & Co., 1922. Pp. xxix-341.

THE TREATMENT OF ORDINARY DISEASES. Notes from the Record Book of an Old Practitioner. By Beverley Robinson, M. D. (Paris). New York: American Medical Publishing Company, 1921. Pp. 132.

NOUVEAU TRAITE DE MEDECINE. Publie sous la direction d MM. des Professeurs G. H. Roger, F. Widal, P. J. Teissier. Fascicule IV, Fascicule VI, 1922. Pp. viii-506. Paris: Masson et Cie, 1922. Pp. 718.

LES TUMEURS DU CERVEAU. Pr. Viggo Christiansen. Avec une preface du Pr. Pierre Marie. Traduction française par M. Polack, publiee avec le concours du Dr. Henri Bouttier. Paris: Masson et Cie, 1921. Pp. viii-337.

AN INDEX OF TREATMENT. By Various Authors. Edited by Robert Hutchison, M. D., F. R. C. P. Revised to Conform with American Usage, by Warren Coleman, M. D. Eighth Edition, Revised and Enlarged. New York: William Wood & Co., 1922. Pp. xviii-1029.

ANNALS OF RÖNTGENOLOGY. A Series of Monographic Atlases. Edited by James T. Case, M. D. Volume II: The Pathological Gallbladder, Röntgenologically Considered by Arial W. George, M. D., and Ralph D. Leonard, M. D. New York: Paul B. Hoeber, 1922. Pp. 143.

TASCHENBUCH DER THERAPIE; MIT BESONDERER BERUCKSICHTIGUNG DER THERAPIE AN DEN BERLINER, WIENER U. A. DEUTSCHEN KLINIKEN. Herausgegeben von Medizinalrat Dr. M. T. Schnirer. Leipzig: Verlan von Curt Kabitzsch, 1922. Pp. 450.

PARTIGENFORSCHUNG UND THERAPIE. Die experimentellen Grundlagen der Partialantigenforschung Eine kritische Zusammenstellung. Von Dr. Max Pinner. Die praktischen Ergebnisse der Partigentherapie, von Dr. H. Grau und Dr. H. Schulte-Tigges. Leipzig: Verlag von Johann Ambrosius Barth, 1922. Pp. 32.

THE PATHOLOGICAL GALLBLADDER, RÖNTGENOLOGICALLY CONSIDERED. By Arial W. George, M. D., and Ralph D. Leonard, A. B., M. D., Boston, Mass. *Annals of Röntgenology.* Volume II. One Hundred and Thirty-five Röntgen Ray Studies on Forty-four Full Page Plates, Three of Which are Photographic and Two Text Illustrations. New York: Paul B. Hoeber, 1922. Pp. 143.

CLINICAL TUBERCULOSIS. By Francis Marion Pottenger, A. M., M. D., LL. D. With Chapter on Laboratory Methods by Joseph Elbert Pottenger, A B., M. D. Volume I: Pathological Anatomy, Pathological Diagnosis, and Prognosis. Second Edition. With One Hundred and Five Text Illustrations and Charts and Six Plates in Colors. Volume II: Complications and Treatment. Second Edition. With Sixty-five Text Illustrations and Charts, and Four Plates in Colors. St. Louis: C. V. Mosby Company, 1922. Pp. 707.

Practical Therapeutics

GONORRHEAL ARTHRITIS TREATED WITH NONSPECIFIC VACCINES.

By Leo L. Michel, M. D.,
New York.

In an article on Infectious Arthritis of Urogenital Focal Origin, published in 1919 (1), my conclusions were: "Infectious arthritis of urogenital origin can result from any bacteria in the urogenital tract. Gonorrheal arthritis may result from anterior as well as posterior urethral infections. The polyarticular variety of arthritis is more frequent than monarticular arthritis. The larger joints are more frequently involved than the smaller ones in gonorrheal arthritis. Nonspecific proteins introduced intravenously are specific for acute infectious arthritis."

Experience since acquired (2) has led me to reintroduce the subject. In my capacity of attending urologist to the Hospital for Joint Diseases, I have the opportunity of observing cases of arthritis in which the focus of infection is the genitourinary tract. I may mention here that, as far as I know, this institution is the only one dedicated to diseases of the joints which maintains an active urological department.

Since the paper first mentioned (1) appeared many cases of gonorrheal arthritis have been under my care both in hospital and private practice. Treatment with the nonspecific vaccines—in my series, the paratyphoid—has been almost a routine procedure. In the majority of cases the statement which closes the conclusions quoted above has been sustained, but in a few the results have not been such as to warrant so broad a statement. In order to classify the types of cases I will cite a few case reports.

Case I.—Acute arthritis (recent). The patient was a male, twenty-five years of age. He had had but one gonorrheal infection and that only of one week's duration, following an incubation period of three days. Though a primary case, arthritis developed two days after the onset of the urethritis. Previously to coming under my care (referred by Dr. Peter Friedman), he had been treated for about a week with anterior urethral injections. He presented clear urines, both first and second glass, and no involvement of posterior urethra. He did have an acute arthritis of the elbow, knee and hand. He was given the paratyphoid injection intravenously. This was followed by a very severe chill. All the pains disappeared after about twenty-four hours, but returned two days later in the elbow. The second injection was given five days after the first, and as indicated a third injection was given at another interval of five days. The arthritis disappeared completely, that of the knee and hand after the first injection, and did not return. The first injection consisted of one hundred million paratyphoid, and the third was five hundred million.

Case II.—Acute arthritis (subacute). An adult male had had a urethral infection for six months. During the second week of the infection an arthritis of both knees developed with severe pain and swelling. He was treated by his family physician for acute rheumatic fever. After six weeks he improved somewhat, but had a recrudescence of the urethral trouble. Two weeks later he was again suffering from acute arthritis of the knees, so severe that he was compelled to come to the hospital. Examination of the urethral discharge revealed the gonococcus. There was posterior involvement, the prostate and seminal vesicles being inflamed and gonococci were found in the secretion. The patient was given a paratyphoid injection intravenously, and felt better within twelve hours. The inflammation of the knees subsided, and the swelling was much reduced. Repetition of the paratyphoid injection intravenously brought the arthritis under control. Incidentally, after these injections we were unable to find the gonococci in the smears from the urethra.

Case III.—Arthritis (chronic). Young adult male had had a urethral infection about three years ago. A year following the onset of the acute urethritis arthritis developed involving both feet. He also had a spur on the right heel and the metatarsal joints as well as the ankle of that foot were seriously involved. He was unable to move about or attend to any work and was a veritable cripple. He had been treated by orthopedists but had never had any treatment for foci of infection in the urogenital tract. The patient was given appropriate treatment for the focus of infection, and paratyphoid injections intravenously. A week after the treatment was begun he threw away his cane and was convinced that he was going to get better because he was able to get about a little. After the third injection of the paratyphoid, no gonococci could be found in the smears. He had had continuous local treatment as well as the vaccines. There was still some pus in the vesicles and prostate, and continued appropriate local treatment had to be carried on to restore these parts to normal. The patient was able to attend to his business, with restored function of the joints.

Case IV.—Gonorrheal spine. Young adult male had had an acute urethral infection, and developed spinal trouble after three weeks. The urethral discharge contained gonococci, yet the prostate was small and firm. Because of the pain, the patient was put in a cast, and the immobilization gave a great deal of relief, and a sense of ease and comfort. In addition, he was given proper treatment for the gonorrheal infection of the urethra, and the paratyphoid injections intravenously. Within two weeks the cast was removed and the patient walked about in perfect comfort.

Case V.—Gonorrheal spine. Young adult male had had three urethral infections. After his second infection, two years previous to the third, he showed spinal involvement and was one of the first patients treated by intravenous paratyphoid injections, and formed one of the cases on which our enthusiasm was based. Last October he was again infected with gonococci, and showed symptoms of spondylitis, as well as painful feet. Spurs were present on both heels. Despite paratyphoid vaccine intravenously and proper antigonorrheal treatment for the foci of infection, the urethra and prostate, the spine had not shown improvement, although six injections instead of the average four had been administered. X ray of the spine led to the possibility of the condition being one of tuberculosis, so a cast was applied. After three months he felt easier but was not without pain. Another course of the paratyphoid was instituted and after the third injection the pain in the spine was relieved and he was able to dispense with the cast. He was then restored to useful function. This case seemed to indicate the necessity for complete interrelationship between the urologist and the orthopedic surgeon, as it was only by the combined efforts that a cure was possible.

COMMENT.

The cases cited above serve to illustrate as mentioned before groups of cases that come under observation. In nearly all of our cases the intravenous injection of the nonspecific vaccine has given excellent results, and restored joints in a comparatively very short time. In other cases, especially those of long standing, the aid of the orthopedist must be had for the application of the proper support (plaster of Paris casts). It is essential that the local treatment for the source of the infection must be appropriate for the eradication of the gonococcus in the genitourinary tract, whether it be purely an anterior infection, or one involving the prostate and seminal vesicles or kidneys. In my opinion, the dose of the vaccine must be large enough to set up a reaction; rise of temperature and chill. It has seemed that the results have been proportionate to the reaction in each case. The disappearance of the gonococci in smears seems to be hastened after the intravenous injection of the vaccine and the subsequent reaction. European observers have found the same result after the injection of whole milk, and have recommended such injections for gonorrheal and other infections. It has also been observed that a course of high fever attending some intercurrent infectious disease has a very favorable influence on the course of a gonococcic infection. This in a way is a confirmation of my work with the paratyphoid vaccine injections.

REFERENCES.

1. Michel, Leo L.: Infectious Arthritis of Urogenital Focal Origin. New York Medical Journal, June 28, 1919.
2. *Idem:* Gonorrheal Arthritis Treated with a Nonspecific Protein Injection. *International Journal of Surgery* 34, 204, 1921.

15 Central Park West.

Ureteroceles.—M. Lavandera (*Surgery, Gynecology and Obstetrics*, February, 1921) asserts that from a careful study of all the papers on ureteroceles from 1856 to the present day, together with the cases reported, seems to warrant the conclusion that ureteroceles, found at birth and at all ages, about equal in number for both sexes, rarely bilateral and frequently associated with other anomalies, are congenital malformations.

A NEW METHOD OF RELIEVING PAIN IN ACUTE EPIDIDYMITIS*

By Louis Nagorsky, M. D.,
New York.

It is a well known fact that treatment for the relief of pain in certain areas of the body is often applied to distant points in the anatomy. In 1897 Fliess (1) called the attention of the medical fraternity to the relation of the nose to the female genitalia. In this article he brought forth the fact that certain tissues in the nares bore a sympathetic relationship to certain tissues of the genitalia. He noticed that during menstruation the erectile tissue of the nares, on one or both sides, was more congested or swollen than during the rest of the month, or nonmenstrual period.

This erectile tissue of the nares was also described by Zuckerkandl (2) as genital spots, or sensitive spots, otherwise known as swell bodies. These bodies are composed of a mucous membrane, covering the turbinate bones at certain places, and consist of connective tissue, the outer layer covered with flat epithelium, the deeper layer forming the periosteum of the turbinate bones. Between these bones are lymph tissue and within this lymph tissue abundant venous plexuses are found. About the plexuses are unstriped muscular fibres in abundance. The presence of these venous knots gives the tissue the character of erectile tissue, such as that found in the corpora cavernosi of the penis.

To refresh our knowledge of this subject further, I will add that the location of these genital spots are situated along the borders and ends of the inferior, middle, and superior turbinate bones.

As the erectile tissues of both sexes do not differ in their anatomical structure and topographical arrangement, and as their functions apparently are analogous, it occurred to me that there must be a similar relationship between the sensitive spots and the male genitalia similar to that in the female. It is known that during coitus the swell bodies become engorged, and this accounts for the occlusion of the nares resulting in difficult breathing.

Fliess has located certain abdominal cramp points or areas in the left nares along the side of the middle turbinate bone. In the treatment of dysmenorrhea, he found that when he cocainized the swell bodies, the patient experienced immediate relief.

Mayer (3) has described the use of intranasal applications of epinephrine for the relief of dysmenorrhea. This same writer, in conjunction with Brettauer (4), applied other methods beside the use of trichloracetic acid, such as galvanocautery and bipolar electricity, with equally good results.

It has been agreed upon by investigators that the reaction which follows the local application of a drug to the nares is a reflex phenomenon. Vicarious menstruation is another proof that the nose belongs in the same category with the genital organs, otherwise how is the monthly nasal flow explained.

As pointed out above, the swell bodies are swollen during congestion of the genitalia of the female. I have observed the same condition present in the male suffering from an acute epididymitis. He will complain of a cold in the nose, and also remark that his nose feels stuffy.

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*Read before the Clinical Society of the Bronx Hospital, March 13, 1922.

This leads me to the belief that if pain was relieved in the female suffering from conditions incident to congested genitalia by this method of treatment, namely, intranasal applications of cocaine, taking other factors into account it might give the same results in the male.

It is evident from our observations and others that the function of the swell bodies is not only to humidify and temper the air to avoid irritating the lower air tract, but they also have a part to play in the sexual makeup. When we realize that erectile tissue all over the body is constructed alike, and that organs having analogous functions are similarly constituted, we know that the uterus, for example, is composed of unstriped or smooth muscle tissue, similar to that found in the vas, epididymis, and seminal vesicles.

Some urologists, in their treatment of gonorrhea, administer belladonna to prevent peristalsis in these organs. This is done with the hope of preventing the urethral infection from being carried to the seminal vesicles, epididymis and testicle. The peristalsis of these organs (i. e., the seminal vesicles and epididymis), in their effort to rid themselves of the effete matter present, might account for the excruciating pain; although it is argued that distention or pressure is the real cause.

Again, if we are to compare this condition (epididymitis) with a mucous colitis, where we have an inflamed intestine, the peristalsis caused by some offending irritant within the intestinal canal, we know that the pain is caused by this violent peristaltic movement, which in its effort to rid that organ of the poison, causes an overstimulation of the nerve ends supplying the walls of the intestines, with the resultant violent pain.

It will be argued that this theory does not answer the question, because it has been stated that only those organs which have a serous covering, and when inflamed, are affected by peristalsis, and that other organs, not so protected, like the epididymis, for example, the pain is due to infiltration or congestion.

We know that all unstriped or smooth muscle tissues are supplied by branches of the sympathetic nervous system, which system is intimately connected with the central nervous system by communicating branches or *rami communicanti*. So that any irritating impulse emanating from the epididymis, for example, is carried through the *rami communicanti* to the central nervous system. As a result of this irritation of the sympathetic nerves, which are visceral nerves, peristalsis ensues; therefore, it seems logical that the peristalsis in an organ composed of smooth, involuntary muscle is the cause of the pain present in that organ, due to local irritation.

Similarly, the nasal mucous membrane, especially the erectile tissue, is likewise enervated by the branches of the sympathetic nervous system. So that an analgesic or anesthetic when is applied to the sensitive spots, the pain impulse apparently is blocked, resulting in its cessation. This phenomenon we attribute to reflex action. Not only drugs, but, as described above, external irritants, such as the electrocautery, accomplish the same reaction; proving no biochemical change takes place.

As my experience is limited to cocaine and novocaine, for local application in the nares, I am not in a position to make any report at this time with other methods. Most likely the results would be the same. The limited number of cases presented for observation leaves much ground for study, and I hope to present more complete data in a future report.

In Dr. J. J. Asch's clinic at the Lenox Hill Hospital, where most of my observations were made with this new form of treatment, it used to be our practice to inject the cocaine or novocaine directly into the epididymis for the relief of pain.

It is not the purpose of this article to enumerate the various methods used for the treatment of acute epididymitis, nor to compare their efficiency; it is only with the intranasal application that we are concerned.

It is remarkable to note the immediate relief the patient obtains from this painless method of relieving pain. When we see a patient suffering with an acute epididymitis straddling into the clinic or our private office, every step an agony, we can appreciate his predicament. But five minutes after the nasal application is made the patient experiences marked relief and often complete relief from pain.

At first it was contended by some of my colleagues that it was a psychic reflex, but as they were convinced that the patient was not cognizant of the nature and purpose of this form of application, they soon realized that there was something about the treatment that did not brook of the speculative.

This method of treatment may be applied not only for the relief of epididymitis, but also for acute hydrocele of the cord, acute orchitis, and traumatic congestion of the genitalia.

The method of applying the treatment consists of placing into the nares an applicator covered with cotton saturated with a one half to one per cent. solution of cocaine or novocaine (without adrenalin) and left in place for five minutes. Careful introduction of the applicator is essential, and must be pushed sufficiently posteriorly so that the medicated cotton lies in close contact with the turbinate borders.

It is a simple, painless operation, and requires very little skill; but in order to obtain the desired effect, the proper technic is essential. The applicator is easily passed, providing the operator hugs the floor of the nasal cavity, and when he feels he has reached the posterior chamber, to gently tilt the distal end of the applicator to an angle of about twenty-five degrees. It is advisable to have the cotton sufficiently thick to clog the posterior nares.

The patient, when questioned a little later, declares he feels much better, and in many instances there is a complete absence of pain. Pressure on the inflamed epididymis is easily tolerated by the patient, and he walks with greater ease. He is able to sleep; whereas, prior to the treatment, the pain rendered him miserable, and caused him to toss about in unrefreshing sleep. The pain may return again in from two to eight hours, but in a mild form. In some cases, the cessation of pain was permanent.

While no claim is made that this treatment acts as an adjuvant in the cure of the disease, it is only for the relief of pain that this new method of treatment is introduced. Below is appended a few of the cases taken at random from clinical and private material.

Case I.—C. D., came to Lenox Hill Dispensary on November 3, 919, with a history of having lifted a heavy barrel on October 30, 1919. Three days later he noticed a swelling of the testicle. He remained in bed until November 3, 1919, when he presented himself for treatment. He was suffering intense pain, and a diagnosis was made of acute orchitis and acute hydrocele of the cord. A one per cent. solution of cocaine was applied intranasally for five minutes. The patient experienced instant relief and was able to walk without pain.

Case II.—H. K., a cook, aged twenty-three, presented himself for treatment on January 20, 1920. He had an attack of acute gonorrhea and a week later right acute epididymitis developed. A one per cent. cocaine solution applied intranasally for five minutes produced marked relief.

Case III.—M. M., a carpenter, had an attack of acute gonorrhea and three days after left acute epididymitis developed. He presented himself for treatment on November 5, 1920. A one per cent. novocaine solution was applied intranasally for five minutes with marked relief. The patient was able to walk with ease.

Case IV.—T. M., came to the Lenox Hill Dispensary for treatment on July 8, 1921. A diagnosis of left epididymitis and vasitis was made and a one per cent. solution of novocaine applied intranasally. The patient experienced complete relief and was able to walk without pain.

Case V.—A. B., a laborer, aged twenty-one years, who suffered from left epididymitis and vasitis. A one per cent. solution of cocaine applied intranasally produced marked relief. The patient was able to walk without pain.

No alarm need be entertained that this method will result in the patient becoming an addict, because one application usually comprises the whole treatment.

In presenting this preliminary report it is with a feeling of hope that this subject will continue to awaken the efforts of the members of the medical fraternity along the lines of painless treatment for the relief of pain. Though my experience has been limited to twenty cases, I feel satisfied that the results have proved very promising.

In conclusion, I wish to thank Dr. J. L. Wollheim for his kind encouragement, and also for trying out in his private practice this method of treatment.

REFERENCES.

1. Fliess: *Relation of Nose and Female Genitalia*, Leipzig, Vienna, 1897, *Centralblätt für Gynécologie*, 1908, p. 981.

2. Ballenger: *Eye, Ear, Nose, and Throat.*

3. Mayer, Emil: *Centralblätt für Laryngologie*, 1902, p. 243.

4. Mayer and Brettauer: Reprint from *Journal A. M. A.*, January 3, 1914.

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Diuretic Action of Calcium Chloride in Nephritis.—L. Blum, Aubel, and Hausknecht (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris*, February 9, 1922) point out that by combining administration of calcium chloride with the salt free diet marked diuresis can be obtained in various forms of nephritis even where the ordinary diuretic measures have failed. The amount of calcium chloride administered in their cases varied from five to as much as nineteen grams a day, the latter amount, however, being continued only for two days, while in some cases eleven grams a day were continued for a week. The cases related include cases of severe hydropigenous chronic nephritis, of acute hemorrhagic glomerulonephritis, and of chronic mixed nephritis. Calcium chloride proved superior to potassium salts, previously used with success in a number of cases of obstinate edema of renal origin, in that it causes gastrointestinal disturbances much less frequently and never induces circulatory symptoms. It can be used in all forms of nephritis, even those associated with marked lesions in the circulatory organs. Calcium chloride is the most effective and harmless diuretic in the edema of Bright's disease, and its administration with the salt poor diet constitutes the treatment of choice in such cases.

Sarcoma of Prostate.—Stern and Ritter (*American Journal of Surgery*, August, 1921) state that of the thirty-six cases thus far reported, there have been eleven different types of sarcoma found. Most of the tumors have been found to occur during infancy and early childhood. Only eight of the growth were found in men over fifty-eight years of age. The tumor itself very frequently has been found to grow to a considerable size, so as to completely fill the pelvis, forcing the bladder upward and forward; at times producing no residual urine, and at other times, when there is pressure upon the prostatic urethra, much residual urine is present. In a case reported by Young, forty-four ounces of residual urine were obtained. The consistency of the tumor may vary from that resembling an abscess, soft, and apparently fluctuating, to a consistency simulating the stony hardness of sarcoma of bone.

Sarcoma of the prostate may have occurred, and probably does occur, more frequently than medical literature indicates; for the symptoms in these cases vary a great deal, as most patients do not complain of any pain or difficulty in urination until urinary obstruction develops. Pain is rarely complained of before the growth has done its damage. In some cases, the diagnosis is not made because the patient complains only of constipation and difficulty in bowel movement from pressure or extension into the rectum. In a few cases, urinary retention was the first symptom of the growth. Hematuria is uncommon in this condition. McGowan reports a case in which the patient was apparently cured, but died four years later of cancer of the liver. This is the longest any patient has lived after the diagnosis was made.

In the case reported by the authors, although the patient had been given prophylactic x ray treatment, and there was an apparent complete removal of the growth at operation, and the patient received

840 milligram hours treatment with radium, yet within two months the growth, which at the time of operation was limited to the left lobe of the prostate, had extended so as to involve the entire bladder, rectum and abdominal wall. Had a positive diagnosis been possible preoperatively, more could have been accomplished by a simple cystotomy accompanied by x ray and radium treatments, than by any known surgical procedure.

Treatment of Pyelitis.—Kretschmer (*Surgery, Gynecology and Obstetrics,* December, 1921) concludes that pelvic lavage with silver nitrate is an efficient, simple method for treating infections in the renal pelvis. In this series of cases 66.4 per cent. of the patients treated were finally discharged with urine sterile and free of pus. In selecting cases for treatment, lesions of the urinary tract of a surgical nature must be excluded. Lesions of the abdominal viscera which may be factors in contributing to relapses or rendering this treatment inefficient must be recognized and treated.

Bone Metastases in Bladder Carcinoma.—H. L. Kretschmer (*Surgery, Gynecology and Obstetrics,* December, 1921) offers the following conclusions: 1. Bone metastases occur beyond a doubt in cases of carcinoma of the bladder. 2. Their occurrence is uncommon as compared to the frequency of bone metastases in carcinoma of the prostate. 3. Extensive metastases may be present although the primary tumor in the bladder be small. 4. Prior to operation or radium treatment, routine examination of the osseous system, by means of röntgen rays, to make certain the presence or absence of metastases should be carried out in all cases.

Pericarditis in Chronic Nephritis.—Alvan L. Barach (*American Journal of the Medical Sciences,* January, 1922) gives a description of the clinical and laboratory characteristics of a group of thirty cases of chronic nephritis at the time of development of an acute pericarditis. A marked nitrogen retention in the blood, a constantly present acidosis, a high blood pressure, severe secondary anemia and a tendency to hemorrhage were conspicuous features. It is pointed out that pericarditis is not a terminal complication in the sense that it always terminates the life of the patient. The average duration of life after the onset of the pericarditis was twenty-nine days. Excluding a patient that lived one year thereafter the average figure was sixteen days. Death in many of these cases did not seem linked with an advancing heart failure or to the acidosis, but rather to the progressive retention of nitrogen in the blood. Except in one case the diagnosis was made by the presence of pericardial friction and not by the signs of effusion. The diagnosis was made clinically in ninety percent. of the cases. In four cases direct culture of the pericardium yielded pyogenic organisms. In four other cases culture of the pericardium was sterile. In the infected cases the cellular infiltration of the pericardium was predominantly of the polynuclear type; in the sterile cases the infiltration was predominantly of mononuclear type. The cases in which the pericardium was not cultured showed the pathological characteristics of the sterile group.

Reasons are given for believing that the majority of cases of pericarditis in chronic nephritis are of noninfectious origin. The assumption of a chemical irritant as cause of the complication is entirely compatible with the chemical toxemia of the patient and with the bacteriological and pathological findings in the pericardium. A small group of cases exists in which frank infection of the pericardium is present. It is believed that the pericarditis in this group is generally of true infectious etiology. The possibility is present, however, that the complication may sometimes be of chemical origin and the inflamed pericardium become secondarily infected.

Clinical Significance of Albumin of Plasma and Treatment of Renal Diseases.—V. Kollert and W. Starlinger (*Wiener klinische Wochenschrift,* February 16, 1922) examined a series of nephroses and found, without exception, excessively high values for fibrinogen, which induce a fifty fold rapid sedimentation of the erythrocytes. Whereas normally, only an opalescent clouding, or at most a finely granular flocculation results from the addition of sodium chloride or from heating, in nephroses the fibrinogen falls in a thick precipitate. In nephroses the variations of the albumin in the blood and urine run parallel. The authors emphasize that not every increase of the fibrinogen content of the plasma is associated with albuminuria, but that the latter appears only when a simultaneous renal injury is present, or when the fibrinogen increase is excessively high. Pure euphyllinum and sodium salicylic theophyllin usually act analogously, but are quantitatively weaker then urea and caffein sodium benzoate. Thyreoidin acts upon the fibrinogen molecule but differently from the other drugs.

Behavior of Syphilitic Leucoderma toward Bloch's Dopa Reaction.—Ernst Gold and Friedrich Reiss (*Wiener klinische Wochenschrift,* February 2, 1922) base their investigations on Bloch's statement that leucoderma, vitiligo and albinosis can be recognized by the absence of the Dopa ferment in the protoplasm of the pigment forming basal and hair matrix cells. In the leucoderma the displacement of the pigment occurs as follows: On the basis of a local hyperpigmentation, of which the hyperpigmented marginal zone is to be considered as the remains, 1, there is in the beginning no or only a slight influence on the epithelial pigment formation, as is shown frequently by only a suggestion of local weakening of the Dopa reaction; 2, there occurs an early beginning, abnormally marked displacement through the lymph stream of the epidermal pigment present and newly forming toward the cutis, as is shown by the increase of the cuticle pigment in fresh leucodermas at the site of the depigmentation, whereas the pigment forming basal cells, with a simultaneous distinctly decreased pigment content, show a partly unchanged or a slightly weakened Dopa reaction; 3, there finally occurs a marked weakening of the Dopa reaction, even down to absence, associated with a decrease in the number of usually active cuticle pigment cells which never react to Dopa, and also in the occasional free pigment, which is only present in so far as the epidermis can form pigment, that is, give a Dopa reaction.

Renal Function in Röntgen Ray Intoxication.—Irvine McQuarrie and G. H. Whipple (*Journal of Experimental Medicine*, February, 1922) report experiments with normal adult dogs exposed to a carefully measured dose of the hard röntgen rays of the Coolidge tube, following which the renal function was determined for a period of a week or more. The results give no support to the current belief that an x ray nephritis may be produced by direct or indirect action of the hard röntgen rays. There was a minimal disturbance of renal function by the direct action of large doses of the hard x rays, but no anatomical evidence of cell injury. Repeated moderate doses of x rays over considerable periods of time have no demonstrable influence on renal function or renal structure. The writers feel assured that clinicians may use the x rays over the kidney areas with confidence that renal tissue is resistant to the hard röntgen rays.

Röntgen Ray Intoxication.—I. S. L. Warren and G. H. Whipple (*Journal of Experimental Medicine*, February, 1922) found that röntgen radiation of the thorax (abdomen shielded) even with large doses, up to 512 milliampere minutes, gives no clinical evidence of intoxication, while such radiation of the abdomen (thorax shielded) with a dose of 350 milliampere minutes will almost certainly cause a fatal intoxication. Normal dogs were used for this work. From their experiments they believe that the fundamental thing in the systemic intoxication due to the röntgen rays is a primary injury of the epithelium of the small intestine. This sensitiveness of the intestinal epithelium to x rays is not appreciated and should be given proper consideration in clinical work. The second and third papers in this series discuss the sequence of clinical, anatomical, and histological changes following a unit dose of x rays, and the speed of autolysis of various body tissues after lethal x ray exposures.

Treatment of Syphilis.—L. W. Shaffer (*Military Surgeon*, November, 1921) says that over four centuries in the treatment of syphilis with mercury failed to develop any satisfactory standard of treatment. More than ten years' experience in modern methods of treatment has likewise failed to bring us much nearer this goal, but advances have been made in this direction. At least the use of arsenicals and mercurials in association, with few exceptions, comprises the basis of modern systems of treatment. Time and observation of treated cases only will determine the mode of application, dosage, number of courses, and the length of periods of rest best applicable for cure.

It is recognized that many syphilographers refrain from announcing a system of treatment, realizing that more is necessary than the simple 1-2-3 steps of system in piloting a given case to cure. It requires a thorough knowledge of the disease, a technical and therapeutic knowledge of methods of treatment, and the handling of complications that cannot be incorporated in a simple standard of treatment. Yet the author strongly favors the adoption of some standard of treatment, at least for early cases of syphilis, in the United States Navy. There are several reasons for the adoption of such a standard. The service would benefit in the establishment of a standard for treatment whereby cases could be checked up and followed through a set course of treatment, barring complications, with less danger to the patient and more promise of cure than where various standards are followed in the same case.

More satisfaction among patients would be produced by a standard treatment, and a better spirit of cooperation would be secured if they were not given various treatments according to the special leanings of different medical officers.

Influence of Syphilis on Pregnant Women.—G. Gellhorn (*Surgery, Gynecology and Obstetrics*, June, 1921) concludes that discussions on syphilis in pregnancy have, in the past, been limited almost altogether to the harm that may befall the unborn child; and most of the textbooks on obstetrics convey the impression that the mother has nothing to fear from the disease. While this is true of a very large percentage of the cases, the writer has attempted to show from personal observations and a review of the available literature that syphilis is capable of producing real complications—whether in pregnancy, by impairing the general health of the patient, or in labor by obstructing the birth passages or causing other more or less serious damage, or else in the puerperium by adding to the morbidity and mortality of that state. The possibility of syphilis must be borne in mind, particularly when one has to deal with obscure recalcitrant disturbances in pregnancy, and once our diagnosis is made, we must give energetic and systematic treatment to such women throughout the period of pregnancy.

Atrophic Pyelonephritis.—William F. Braasch (*Northwest Medicine*, January, 1922) says that at operation it is often difficult to find the diseased kidney, since it is often displaced and covered with fibrous tissue as a result of accompanying perinephritis. The kidney may be only three to five centimetres in diameter and is easily overlooked. Although the small amount of tissue removed is out of proportion to the severity of the patient's symptoms, nevertheless such symptoms disappear following removal of the kidney. The results of operation for atrophic pyelonephritis have been very satisfactory. Improvement or cessation of vesical symptoms and improvement of the general condition have been accomplished for practically every patient. Only three patients out of twenty-two reported that evidence of urinary infection persisted, and only one of these asserted that there was no improvement. One patient was reported as having died from unknown cause three months after operation.

Treatment of Visceral Syphilis.—Thomas McCrae (*Therapeutic Gazette*, February 15, 1922) believes that the cure of the spirochetal infection in visceral syphilis is to be hoped for but is uncertain. Arsphenamine and neoarsphenamine should be given in small doses, especially with aortic disease, and not at all in hepatic syphilis. Mercury should be regarded as an important aid in treatment. Treatment should be given as intensively as possible and repeated once a year for five years or even once a year for the duration of the patient's life. Our attitude towards the Wassermann reaction, whether positive or negative, should be a conservative one.

Proceedings of Societies

NEW YORK ACADEMY OF MEDICINE.

SECTION IN GENITOURINARY SURGERY

Stated Meeting Held on January 18, 1922.

Dr. ABRAHAM HYMAN, Chairman of the Section, Presiding.

Renal Calculi.—Dr. B. S. BARRINGER presented a kidney containing three large calculi which had been removed from a patient giving symptoms that indicated nephrectomy as the operation of choice; two of the large stones had filled the kidney pelvis. The patient was a fat woman, forty years of age, who made an uneventful recovery from the operation.

Hydronephrosis.—The second kidney specimen exhibited by Dr. Barringer had been removed from a patient who was still in the hospital. She gave a history of having had a pain in the right side for a number of years. She had had two operations, one for gallstones and one for appendicitis, but still had the pain. Her physician discovered that there was a large tumor in the right side of the abdomen, within an inch of the umbilicus; it was movable and felt cystic. Catheterization showed no urine from the right side and normal function on the left side. An attempt was made to get a pyelogram, but the bromide did not go into the kidney pelvis. The x ray showed only a large mass occupying the site of the right kidney. It seemed probable that there existed kidney tumor, and on cutting down this large mass a hydronephrotic kidney was found. The interesting part of the case was that there were no veins at the lower part of the kidney causing the hydronephrosis. Evidently the hydronephrosis was caused by adhesions around the upper ureter. The kidney was removed without difficulty and the patient made a good recovery.

Cystograms of Interesting Bladder Cases.—Dr. O. S. LOWSLEY presented a series of lantern slides of interesting cases of bladder disease, some of which were: 1. Sodium iodide picture of a diverticulum with the opening into the bladder occurring at the posttrigonal region.

2. The relation of the internal sphincter in tabes, in which condition the bladder and posterior urethra formed practically one and the same organ. It extended to the umbilicus and presented a number of irregularities.

3. Sodium iodide in woman's kidney, showing the calices around the kidney.

4. The picture of a catheter coiled up in a diverticulum after the method proposed by Dr. Alfred Osgood. A catheter may be seen in the diverticulum.

5. The diverticulum injected.

6. A similar diverticulum with the catheter coiled in it and the other catheter passing into the ureter and kidney pelvis. There was a similar filling of the diverticulum in that case with a little leaking into the bladder.

7. The same case, with complete degeneration of the bladder, showing the numerous smaller diverticulæ. The opening of the main diverticulum faintly shown, and an enormous diverticulum filled to capacity. The ureter passed under the diverticulum.

8. Shows injection of the ureter. The kidney had been removed from this side, and a partial injection of the ureter was made on that side.

9. An extrophy of the bladder. The two ureters could be seen here, and the big red mass on the front of the man's abdomen. This showed the absence of the pubic bones, which always occurs in these cases.

10. A cystitis cystica, a cross section of the vesical lining.

11. A cystogram with double ureter and double kidney pelvis on both sides.

12. This picture showed the two kidney pelvis, the ureters in close apposition as they descended. The other kidney could be seen at this point, with the ureters coming down here.

Dr. O. S. Lowsley, replying to a question from Dr. Pedersen in regard to the method used, said that the beef kidneys were filled with the solution under considerable pressure. The rabbits' kidneys were filled so full that with the kidney exposed one could see the kidney itself swell. The conditions were made as unfavorable as possible. The damage was noted two weeks afterward. The solution was tried in various strengths, and a fairly good shadow was obtained with ten per cent. sodium iodide, but practically all the pictures were taken with twenty per cent., which did not seem to irritate.

Demonstration of Instruments.—Dr. VICTOR C. PEDERSEN presented a syringe of which the main features were a metal case, all wearing parts asbestos, and Scotch gauge glass cylinder. This glass must be the genuine Scotch gauge glass which was annealed for boiling water and steam, thick enough to hold against steam pressures, and elastic enough to accept considerable rough handling. The syringe might be dropped into boiling hot water or upon the floor, or instruments might fall upon it in ordinary ways without breaking it.

Dr. Pedersen next presented a virgin speculum for diagnosis in venereal disease suspects in young unmarried women of full stature and therefore with long vaginas. The usual virgin speculum was an inch shorter than that for childbearing women, hence it must be crowded into the vulva of such young women, in order to reach the cervix, which it often failed to do. The crowding brought the expanding conical portion at the hinge against the hymen and damaged it in girls who had not had coitus. The speculum shown had the full length of the standard instrument for parous women, but all other measurements were those of the former virgin type. This speculum had been endorsed by the New York Medical College and Hospital for Women.

Dr. HYMAN, introducing Dr. Carelli, said that he had been in New York for the past three weeks, he had had a large experience with this work, having injected over 300 cases in his own office. Not content with injections of air into a preformed cavity, he had undertaken to introduce air and make a new cavity and had devised a method of injecting air into the perirenal space so as to bring the kidney into sharper outline.

Pneumoradiography.—Dr. H. H. Carelli, of Buenos Aires, demonstrated a new procedure to visualize the kidneys and suprarenal glands, the method employed, and demonstrated a large number of films in which all the parts of the kidney stood out showing their contour and relative positions, almost as clearly as revealed by an autopsy, the suprarenal glands being clearly seen. Radiograms of intraperitoneal air injections showed nearly all the solid organs of the peritoneal cavity, and were found to be useful in studying tumors, uric acid calculi and tuberculosis of the kidney.

Dr. LeWald said that the work done by Dr. Carelli was one of the four or five greatest advances made since röntgenography was discovered. The use of air injected into the peritoneal cavity had been worked up in this city by Dr. Stewart and Dr. Stein, who gave full credit to Dr. Carelli for his improved technic. The use of air about the kidney was entirely new here, and the result wonderful; the field was practically unexplored, and offered boundless opportunities for study. The question of lesions of the suprarenal gland was included in this field, and much might be learned there shortly. Tumors occurred in this region that were not definitely connected with the kidney or the suprarenals but were closely related. He had seen some cases that could doubtless have been diagnosed with this new technic, had it been available. Of course with any new procedure the question would always arise as to whether it was attended with any dangers or discomforts, and any points that Dr. Carelli could add in regard to the technic would be most acceptable and much appreciated. It seemed to be harmless and without any restrictions. Dr. LeWald wanted to know whether after Dr. Carelli changed back to air using carbon dioxide and whether he considered air perfectly satisfactory, and the best gas to be used for this purpose.

Dr. Beer said that the work of Dr. Carelli marked a distinct advance in radiography of the retroperitoneal organs, the adrenals and the kidneys, and that he was to be congratulated upon adding to the knowledge and the refinement of radiological technic. Beside the adrenals there were several conditions in which this method should be tried. In renal hematuria of unknown origin, where the diagnosis of neoplasm could not be made, this new method might throw much light on the condition and suggest the proper diagnosis when a neoplasm was present. Then, with patients who were suffering from attacks of renal colic, in the presence of negative radiographs, the question arose whether they were suffering from uratic or uric acid stones and whether these would show when the kidney was surrounded by an emphysema. Dr. Carelli had shown a case in which a stone, which did not show on the x ray plate, was found by this method. If that was the rule, this method would be of the greatest aid in the diagnosis of renal stones of this composition. Up to this time uric acid stones (in this neighborhood) had comprised about twelve per cent. of the cases and it had been almost impossible to recognize them except by passing a wax bougie into the pelvis.

Dr. Martin Ware said he wished to direct the attention of the section to an article which appeared in the *Journal A. M. A.*, December 31, 1921, in which reference was made to a perirenal infiltration of air as the method of Rosenstein; and also to state that it was the consensus of opinion of the members present at the Urological Congress that the method was fraught with many dangers. He hoped that Dr. Carelli might be able to throw some light on this point.

Dr. Hirsch said that Dr. Carelli had demonstrated the method and the radiographs in the laboratory at Bellevue Hospital. The demonstration was certainly a convincing one. He had employed the method twice and Dr. Keyes had employed it in one case. It was apparently without danger. If there was any difficulty at all in the technic, it was in the finding of the transverse process of the second lumbar. This might be palpated or might be determined by marking a point four inches above the posterior intercostal line and one and a half inches from the median line. No anesthesia was necessary for the procedure. The needle used was an ordinary lumbar puncture needle of not too large calibre with the stylet in place. This was inserted about an inch and three quarters until the transverse process of the second lumbar was felt with the needle. The point of the needle was then depressed so that it entered the perirenal fat just below the transverse process. The full distance of the outer skin from the point of the needle should then be about two inches. From three to six hundred cubic centimetres of oxygen were injected. The radiographs were likely to show the kidney distinctly. Apparently in Dr. Keyes's case it cleared up the diagnosis. In the making of the exposure it was not necessary to apply pressure nor was the cone brought into contact with the patient, nor was the usual upward tilting of the tube made. This method was a decided step in the direction of the improvement of the technic of the examination of the kidney, and Dr. Carelli was to be congratulated upon this achievement.

Dr. Jeck said that Dr. Keyes was so pleased with the result of his first trial of this new method that he had asked him to report the case in detail. The patient was first admitted to Bellevue Hospital in February, 1920. His chief complaint was pain in the right loin and increased frequency of urination. His history at that time, which was much the same as it is at present, was as follows:

For fifteen months the patient had been suffering from dull grinding pain in the right loin with occasional acute exacerbations. At times this pain would radiate to the groin and seemed to be increased by activity. Frequency varied from two to eight times at night, and every four hours to every half hour by day. Physical examination revealed a slight tenderness over the right kidney region, and also a slight discomfort over the right lower quadrant on pressure. Both epididymes were indurated, but not nodular, vasa not enlarged, prostate and vesicles scarred (presumably inactive lesions of tuberculosis).

Two cystoscopic examinations were made at the time of the patient's first admission, but neither presented any conclusive evidence. The urine from both kidneys showed a few scattered leucocytes and in the first cystoscopy the function of the left kidney was apparently slightly better than the right, while at the second cystoscopy the reverse was true. Acid fast bacilli were looked for in the urine, but not found. On account of the almost negative cystoscopic findings, together with uncertain x ray findings, the patient was discharged with instructions to return in case his symptoms persisted after a reasonable length of time.

He returned in January of this year, and was again cystoscoped. We were unable to get any kind of a catheter up the right ureter for a distance of more than one centimetre. A small quantity of indigocarmine, injected intravenously, appeared promptly from the left ureteral orifice, but not at all from the right during twenty minutes' observation.

In the hope that we might get a ureteral catheter up the right ureter to obtain a pyelogram, the patient was again cystoscoped a few days later by Dr. Keyes. Both Dr. Keyes and Dr. Jeck failed to pass the catheter more than one centimetre past the right ureteral orifice. Indigocarmine, ten c. c., were injected intravenously and appeared promptly in good concentration from the left ureter. A faint trace only came from the right side during ten minutes' close observation.

It was at this juncture that Dr. Carelli appeared at Bellevue Hospital, with his new method of taking kidney radiograms by means of injecting oxygen into the perirenal tissues. In view of the still uncertain diagnosis, Dr. Keyes himself injected air into this patient and had him x rayed, with the result shown here. Dr. Keyes believed that these radiograms probably indicated a hydronephrosis at least, and he would therefore operate on the patient in a couple of days.

Dr. LeWald said that he once had had an opportunity to perform an autopsy in a case of transposed viscera. The suprarenal glands were definite in shape, one being crescentic and the other triangular. In cases of transposed viscera one could readily make the diagnosis with this method, for normally the right suprarenal was trianguar, and the left crescentic. If on x ray examination one should find a crescentic shaped suprarenal on the right side the inference could be drawn that there was a complete transposition of the viscera.

Dr. Carelli, in closing the discussion, said in reply to Dr. LeWald's question that he used carbon dioxide only in his office, where he was sure of being able to take the radiograph before the absorption of the carbon dioxide took place. The carbon dioxide usually disappeared within an hour or so. The nitrogen was not absorbed as quickly as the pure oxygen. Probably the discomfort of the patient would be longer; but in his experience every patient had been able to leave the office in the same condition in which he entered it; and those who had seen the work here—Dr. Hirsch, Dr. Imboden and Dr. Hyman—had seen the patients get up and leave the table without any discomfort.

Dr. Carelli said he agreed entirely with what Dr. Beer had said about the indications from the urological point of view, and that he had tried to show a procedure which he thought would be helpful in urological conditions. In regard to the work of Dr. Rosenstein, he said that he had left Buenos Aires in September, 1921, and before that had made his first communication to the Argentine Society of which he was president; and being in Berlin with Dr. Rosenstein, the latter stated that he had published his work recently—perhaps in December—but that his own communications had been made five or six months before that, so that there was no question about the priority. Dr. Rosenstein himself admitted that his technic was not so sure as Dr. Carelli's.

Dr. Carelli said that he made the injections with a special apparatus whereas Dr. Rosenstein injected only air with a syringe. It was necessary to use caution and not put the needle in anywhere and produce an emphysema.

Referring to Dr. Hirsch's remarks, Dr. Carelli said there was no difficulty in finding the transverse processes. In thin persons one could very well palpate the first and second lumbar processes; between those two was the transverse process. In abnormal cases the point of departure might be three to four centimetres outside the middle line. At Mount Sinai the method was successfully used in an exceptionally fat woman. Only in very stout persons was it necessary to take an x ray with a metallic point in position. Generally he touched the two spinous processes and between them made the puncture.

Replying to an inquiry from Dr. Lowsley, Dr. Carelli said that he employed the Forlanini apparatus, and then drew a diagram and showed the method of using it in making retroperitoneal injections.

Dr. Hyman agreed with what Dr. Carelli had said, that at Mount Sinai they gave him a very difficult subject to demonstrate; the patient was an enormously fat woman, and if he could succeed in that case he certainly could succeed in any. He then said he was sure the members of the section would join him in a vote of thanks to Dr. Carelli for his brilliant demonstration.

Contracture of the Bladder Neck.—Dr. Edwin Beer read a paper on this subject, which appears on page 536 of this issue.

Dr. Lowsley expressed his appreciation of Dr. Beer's excellent presentation of the subject, although he did not agree with him that the suprapubic method of approach was the best. He himself always approached it through the urethra, either with the Young punch or with the high frequency current—rarely by the Chetwood method, for that was apt to result in incontinence. His reason for preferring the intraurethral operation was that the period of convalescence was shorter and one did not have to close a leaking wound in the suprapubic region; also the operation by the suprapubic route was unnecessarily large, and no matter what method was employed, continued dilatations were necessary afterward to keep the condition from recurring.

Dr. LeWald said that the condition of cardiospasm was a very striking one, and one could almost substitute that term wherever Dr. Beer used the term contracture. He had seen the condition in children of ten to twelve years of age, although usually it was only seen in persons of twenty to thirty, and he had even seen it at sixty. There was no doubt that it was of early origin and was of the same nature as the contracture of which Dr. Beer had spoken.

Dr. Victor Pedersen inquired whether Dr. Beer had ever looked into the etiology of these cases from the viewpoint of early colon bacillus cystitis. He had seen a number of cases in young children. If the intensity of such cystitis were to reach the ulcerative degree then stenosis at the neck of the bladder would surely ensue, because the trigonum invariably suffered first and most from ulceration. Dr. Pedersen said he recently had had three cases in females. In one case, in an adult, bacillus coli ulcerative cystitis was so severe that it simulated cancer and would certainly have added cicatricial deformity to the infiltrating contracture of the bladder, if the patient had survived the general condition long enough. The second case, in a nine year old child, probably duplicated the first case, but the patient died soon after the consultation. Hence no subsequent data were known, as no autopsy was permitted. The third was in a three year old child, with hemorrhagic cystitis and colon bacilluria.

Dr. Barringer said that last summer he had seen the only surviving patient in sixty or seventy cases in which Dr. Keyes had operated by the Bottini method, and that patient had residual urine. Some ten years ago he had himself operated in a case of contracture of the neck of the bladder, and the patient had had partial incontinence ever since. Six months ago he had six ounces of residual urine.

Dr. Hyman said that Dr. Beer had brought out a very interesting point, and asked that he draw a diagram of the picture seen through the posterior urethroscope which he had stated was diagnostic. He then cited a case observed two years ago of a patient in his early forties, with a history of frequent urination dating back at least ten years. The man had been treated and had had his bladder irrigated with all sorts of medications, but no diagnosis had been made. At the time he came under observation he had eighteen ounces of very foul smelling turbid urine. The urethroscopic picture was the same as that described by Dr. Beer. A diagnosis of contracture of the neck of the bladder was made and dilatation was instituted with the Kollman dilator, and iodides given internally. The Wassermann test was negative. There was no improvement, however, and the patient finally consented to an operation. On opening the bladder a very tight internal sphincter was found, with the posterior lip resembling the lip of the cervix—a very hard posterior lip. A V shaped excision was made, and the bladder was closed, with drainage. The patient recovered and did very well. The residual urine came to three or four ounces, but the frequency and pyuria persisted, although the urine was clearer than before operation. Irrigations were kept up with the usual solutions, but there was no improvement. One day the patient was cystoscoped, using only cyanide of mercury; using a 1-2,000 solution instead of the usual 1-5,000. He had a very severe reaction, following this after which his urine became absolutely clear. He returns once in a while for observation, and when examined last two or three weeks ago there was not a dram of residual urine; he had had no frequency, and his urine was absolutely clear.

Dr. Beer, in closing, said that it may not be appreciated by those who were not members of the section how commonly this condition was not recognized by the practitioner. Young men came in with ten to twenty ounces of residual urine, not having noticed the trouble until they used a public urinal and found that they could not void as quickly as their neighbors. In connection with the cases in young children, it was interesting to note that the cases presented with the x rays showed the same picture as the adult cases and, apparently, those cases that have only a mild obstruction in youth present themselves at twenty or thirty years of age as adult cases of contracture of the neck of the bladder. He said that at present he had under observation in the hospital a child of five with residual urine of thirteen ounces, pyuria and pyonephrosis, who was living on his right kidney. Only a few days ago his bladder was opened and the posterior lip of the vesical outlet was excised. It was only by giving a free outlet at the neck of the bladder that relief could be obtained in these cases, and beyond doubt there were a number of these patients living who had had one kidney removed without the surgeon realizing that it was a bilateral process. In one case a child, seen some years ago; the patient came in with a temperature and tender bladder, due to cystitis, with residual urine suggesting the picture of intraabdominal abscess. So far as the posterior urethra was concerned, it was a rather typical picture. In view of the fact that in many of these cases there might be complicating conditions, a simple punch operation might not cure. It was, therefore, more advisable at present to go in suprapubically and do whatever was necessary plus the removal of the bar.

Dr. Beer said that so far as cauterization was concerned, the worst hemorrhage he had ever had in such a case occurred after cauterization with bipolar high frequency current. The patient had to be transfused and almost died on the table before the bleeding was controlled. That took place twenty-six days after the cauterization, so whether one excised or used high frequency cauterization, the patient was liable to have bleeding and rarely it might be almost uncontrollable.

Pyelitis.—H. Dawson Furniss (*New York State Journal of Medicine,* January, 1922) advises, in acute attacks, that the patient be put to bed, and heat or dry cupping applied to the renal region. For the first week or ten days sodium citrate or sodium bicarbonate or both are given every three hours in forty to sixty grain doses; if not tolerated by mouth they may be given by rectum. Water is forced by mouth, and colonic irrigation either with tap water or two per cent. soda bicarbonate solution is done once or twice daily. If pregnancy is present an attempt is made to relieve pressure by posture. When the temperature drops to normal, which usually happens in a few days, the patient is put on urotropin and acid sodium phosphate. Should such favorable effect not be produced in a few days, then ureteral catheterization and renal lavage should be done; most satisfaction has followed the use of one-half per cent. silver nitrate solution. In chronic cases we should determine the function of the kidney and the damage done, and it is in these cases that is seen the greatest value of local treatment. The lavage treatment is applicable in girls of four years or over, and in boys as young as eight years.

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Letters to the Editors.

INTRAVENOUS AND SUBLINGUAL MEDICATION.

New York, *April 10, 1922.*

To the Editors:

Today intravenous medication is becoming the mode more and more. It is considered and properly so, in many instances, as being more accurate and less objectionable, than hypodermic injections into the muscles, or under the skin. While this is true, it must be constantly borne in mind that it must be used with great care and knowledge to be really useful, and if not useful, it may be often injurious and sometimes, even fatal in its effects.

There are numerous instances, however, in which sublingual medication may take the place advantageously, of both intravenous and hypodermic methods of treatment. This is eminently true where rapid effects are essential, either to abolish or mitigate pain, or to preserve life from impending heart failure. I have insisted upon this important fact several times in the last few years and have had corroborative testimony to its great practical value from successful and able practitioners. I wish very earnestly that sublingual medication, in view of its great advantages at times, both to doctor and to patient, would come into more general use and have a far wider acceptance by my profession, than it has at present. To those who wish to know further my conviction and belief in this matter, I refer them to the *Medical Record*, December 29, 1917.

Beverley Robinson, M.D.

AUTOTHERAPY.

Brooklyn, N. Y., *February 7, 1922.*

To the Editors:

In your issue of February 1, 1922, you publish a paper by Dr. Thomas M. Stewart, of Cincinnati, Ohio, on Autotherapy, in which credit is given for this form of treatment to Duncan, Waag, Brodin, Goldschmidt and others. Permit me to inform you and, through you, Dr. Stewart, that in October, 1910, Dr. L. D. Rogers, of Chicago, was the first physician to experiment with autotherapy. He employed this method, using the patient's blood, in a hopeless, inoperable case of cancer and, although the patient died six months later, the improvement in the patient's general condition was so marked that Dr. Rogers and many of his colleagues were led to use this form of treatment ever since, in all chronic diseases with, they assert, about eighty-five per cent. cures or restoration to normal bodily functions.

Dr. Rogers termed this method autohemic therapy and the Autohemic Society of America was organized a few years later with a membership of over a thousand physicians scattered throughout the United States, Mexico, and South America. Their reports on autohemic treatment are remarkable for the success they state they obtained.

Dr. Rogers is the editor of the *North American Journal of Homeopathy* and, I presume, the Autohemic Society is made up mainly of homeopaths. They use the blood only and the technic used in making the autohemic serum is as follows: Under strictly aseptic precautions, one c. c. of blood is withdrawn from a vein and immediately put into a sterilized bottle containing nineteen c. c. of double or triple distilled water and allowed to stand for four hours and then violently shaken several times. Just why the time is limited to four hours I do not know. From this mixture of one c. c. of blood and nineteen c. c. of water, two c. c. are withdrawn and mixed with eighteen c. c. of double or triple distilled water and again violently shaken several times, and thus the process is repeated several times to potentize and attentuate the serum as many times as the doctor thinks advisable in the particular case under treatment, and then five c. c. of the many times subdivided solution is returned to the patient intravenously. The injection is repeated with a freshly prepared serum at intervals varying from one to several weeks depending upon the patient's reaction to the first injection. The exact amount of blood which the patient gets back into his venous circulation with the final solution is beyond my limited knowledge of arithmetic to compute.

Originally the first solution of blood was incubated for from six to twenty-four hours at body temperature and filtered before the subsequent solutions were made, but now both incubation and filtration are discarded as they proved of no therapeutic advantage.

My object in writing this letter is to place the credit for a therapeutic discovery where the credit is due, without regard to "race, creed or previous condition of servitude." I do not know Dr. Rogers except through his extensive writing and I am not a homeopath; neither am I ready to endorse autohemic or autotherapy before this promising method has been sufficiently tried and its *modus operandi* explained.

Dr. Stewart's paper is, to my knowledge, the first attempt at a rational and scientific explanation of why antibodies, produced by nature within the animal body as a protective or combative agent against disease will, when withdrawn, mixed and diluted with a foreign substance, such as water, react more favorably upon the body of the host than in their original state and virility.

I am sure that you are familiar with the work of Dr. Rogers and his followers in autohemic therapy, and will agree with me that credit should be given them in the medical press for the work they have done in what may prove the treatment of choice in the future.

Samuel A. Lewin, M. D.

HEALTH CONDITIONS IN PORTO RICO.

Newark, N. J., *March 31, 1922.*

To the Editors:

Permit me to draw attention to the recently published annual report of the Commissioner of Health of Porto Rico. The death rate for the island during 1918-19 is stated to have been 31.75 in 1,000, having steadily increased from a minimum rate of 18.44 in 1,000 prevailing during 1913-14. The annual average for the last decade was 24.1 in 1,000 of population. During the year ending June 30, 1920, the rate was 23.3 in 1,000. It is evident that the American occupation of the island has not brought the sanitary reforms anticipated. It is true that the density of population is one of the highest of areas of similar size, but this would be of less importance than the fact, as stated in the report, that the population is "badly housed and fed, ill in health and ignorant of the first principles of hygiene." If we have any duty toward the island, which was brought under our control as the result of the Spanish-American war, it is to provide conditions that will favor health, energy, and longevity. Apparently we have lamentably failed during the long period since the affairs of the island, including its sanitary administration, have been under our control.

Of the mortality from all causes, 45.49 per cent. occurred at ages under five years. The infant death rate during 1919-20 was 14.5 in 1,000 births. The principal causes of infant mortality are: enteritis, with 21,363 deaths; infantile tetanus, with 3,062 deaths; rickets, with 5,247 deaths; and congenital debility, with 6,151 deaths. As observed in the health commissioner's report, "If we investigate, we shall find that infantile tetanus, umbilical hemorrhage, congenital debility, and lack of care are responsible for nearly all of such deaths; all avoidable causes if the value of personal hygiene during the whole period of gestation and the special care that must be rendered to the newborn child were fully appreciated." Among conditions favoring a higher infant mortality mention is made of the high price of milk and its adulteration.

On the subject of malaria, the data are of special interest. During 1919-20 there were 1,576 deaths attributed to malaria, equivalent to 5.2 per cent. of the deaths from all causes. It is argued that to reduce the mortality a more intensive campaign is necessary, but it is not indicated that any campaign along accepted lines is carried out. Reliance is placed upon the Rockefeller Foundation for its financial support, but this is evidently a matter which should be borne in its entirety out of the island treasury.

Influenza caused 550 deaths among some 50,000 persons attacked. It is said that the new outbreak during February, March and April, 1921, was "quickly suppressed," but by what means the disease was brought under the control of the authorities is not indicated.

The number of lepers under segregation in the island is 33. The conditions under which the lepers are cared for have been referred to by some writers as disgraceful. It is said in the report that, "as soon as circumstances permit it, all the necessary steps should be taken so that the lepers of Porto Rico may enjoy a better lodging." Porto Rico, in this respect, might learn a valuable lesson from what is being done at the present time in Trinidad.

It may be of interest in this connection to point out that cancer is relatively rare. The number of deaths during the year ended June 30, 1920, according to parts affected, was as follows: cancer of the buccal cavity, 20; of the stomach and liver, 67; of the peritoneum, intestines, and rectum, 34; of the female generative organs, 141; of the breast, 10; of the skin, 8; of other organs and parts, 103; a total of 383, which on the basis of a population of 1,299,809 is equivalent to a rate of 29.5 in 100,000. The people of the United States went to war with Cuba on account of the deplorable sanitary neglect of the island and the menace resulting from continuous outbreaks of yellow fever. We certainly owe it to the people of Porto Rico that we aid them in securing a sanitary administration that will reduce the death rate of the island to at least the formerly accepted sanitary norm of 15 in 1,000, which is about two points in excess of the present death rate of the registration area of the United States.

Frederick L. Hoffman.

MEDICAL AID FOR RUSSIA.

The following letter has been received from the executive secretary of American Medical Aid for Russia. Biweekly purchases of medical goods are being made for shipment to an American Hospital in Moscow. Considerable material has been sent, but more is required. The distribution is made through the Quaker organization, the American Friends' Service Committee. Physicians, known for their generosity, should respond to this appeal:

New York, *April 12, 1922.*

My dear doctor:

This committee appeals to you for a contribution toward American medical aid for stricken Russia.

Hunger, cold, exhaustion, and lack of all medical facilities for a period of seven years have caused an increase in epidemic diseases without precedent in modern times.

QUOTATIONS FROM BULLETINS OF RUSSIAN HEALTH DEPARTMENT.

	Prewar average 1904-1913	1920
Typhus fever	99,798	27,777,500
Relapsing fever	53,616	1,031,624
Cholera	(*)	22,106

*Figures not available; the averages annual rate for the five years, 1915-1919, was 15,337.

These figures, it will be noted, represent the epidemic situation prior to the famine which began in the summer of 1921. Today, health conditions in Russia cannot be reduced to statistics. Official reports indicate that the health authorities are straining every effort to meet a situation which the total lack of all necessary supplies renders impossible of control.

Russian physicians are doing all that is humanly possible, but they lack the most elementary facilities for diagnosis and treatment. What you contribute will be used to buy thermometers, soap, dressings, quinine, narcotics, surgical instruments, anesthetics, and disinfectants. Will you not help your Russian colleagues carry the burden of relieving their suffering country?

Please send us your check! Please do not delay!

Faithfully yours,
Haven Emerson,
Chairman, New York State Campaign.

P. S.—Please make all checks payable to the American Medical Aid for Russia.

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Gregory Stragnell, M. D., *Editor.*

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NEW YORK, WEDNESDAY, MAY 3, 1922.

Miscellany.

Tumor of Bladder.—A. J. Scholl (*Surgery, Gynecology and Obstetrics,* February, 1922) from a study of the histology and mortality in cases of tumor of the bladder states that in one hundred and sixty-eight epithelial tumors of the bladder removed at operation were three benign papillomata. The three patients were alive on an average of five years after operation. In these one hundred and sixty-eight cases were seventy-one malignant papillomata and ninety-four solid carcinomata. Twenty-six (36.6 per cent.) of the patients in the first group have been dead on an average of eleven months after operation, in contrast to sixty-seven (71.2 per cent.) of the latter group who died on an average of seven and one-half months after operation. Forty-five (43.4 per cent.) of the patients with malignant papillomata are alive on an average of three years and three months since their operation, in contrast to twenty-seven (28.8 per cent.) of the patients with solid carcinoma who are alive on an average of two years and three months. Forty-one and nine tenths per cent. of all patients operated on for malignant papilloma have lived more than three years after operation, only 10.6 per cent. of patients with solid carcinoma have lived more than three years after operation. The incidence of recurrence following operation on patients for solid carcinoma is much greater than that for malignant papilloma. In a solid tumor the local extension is generally more advanced; the removal requires a more extensive operation and the immediate mortality is greater.

Squamous cell carcinomata of the bladder are extremely malignant and rapidly fatal; five or six patients with tumors of this type died after a very short period of symptoms. Adenocarcinomata are about as severely malignant as papillomata. Of five patients one died two years after operation, one had a recurrence in two years, three are well, two six months and one two years after operation. Simple angiomata of the bladder may grow so large as to cause obstruction. In three cases, one child of seven died of hemorrhage from a tumor growing from the bladder to the rectum; a man aged seventy-six years was first seen in an inoperable condition; and a girl aged nineteen years had an extremely large tumor in the dome of the bladder. This was removed, and five years later the patient was perfectly well. Myomata of the bladder often grow very large. There was one patient in the series with myoma. Eight years after the removal of a large tumor the patient was alive and well. Generally myxomata occur in young persons. Two infants in the series had myxomata; both died shortly after operation. Sarcoma is probably the rarest and most malignant of vesical tumors. It occurs in middle aged persons, metastasizes extensively, and has a tendency to recur rapidly.

Varicose Veins of the Female Pelvis.—Ludwig A. Enge (*Surgery, Gynecology and Obstetrics,* February, 1921) sums up from his observations that varicose veins of the broad ligament in general and of the ovarian circulation in particular are comparatively common occurrences in women; that the symptomatology is plain enough in most uncomplicated cases to suggest their presence; that the diagnosis is, in most instances, made certain by rectovaginal examination in the recumbent, alternating with the sitting position; that the differential diagnosis is aided by the normal leucocyte count; that mild and early cases can be permanently relieved by conservative measures; that the resection of the veins, or more so hysterectomies, is unnecessary to accomplish a cure; that a high suspension of the uterus with a shortening of the uterosacral ligaments offers the best means for a permanent symptomatic cure with a possibility of a permanent anatomical regulation.

Pulmonary Syphilis.—A. Egdahl (*Military Surgeon,* February, 1922) reports a case and the literature of pulmonary syphilis and concludes that syphilis of the lung is probably not as rare as it is supposed to be and that it should be considered a possibility in all cases of pulmonary involvement where the causative agent cannot be demonstrated. This possibility will be greatly strengthened by a positive Wassermann, a history of luetic infection, or the presence of syphilitic lesions elsewhere in the body. These patients should be given antisyphilitic treatment, particularly as such excellent results are obtained in uncomplicated cases. The treatment of this condition consists in the prevention of syphilis and the proper treatment of all cases of syphilis at the earliest possible date, keeping the patients under observation for some time after.

Focal Infection in Gonorrheal Arthritis.—J. H. Cunningham (*Surgery, Gynecology and Obstretrics,* June, 1921) states:

"I wish to urge that the possibility of foci of infection in the deep genital structures be included in the differential diagnosis of infectious arthritis, and I feel certain that those who recognize such lesions and deal with them surgically will be enthusiastic about the results."

New York Medical Journal
and
Medical Record
Philadelphia Medical Journal and the Medical News
A Semimonthly Review of Medicine and Surgery, Established 1843.

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A Contribution to the Etiology of Feeblemindedness with Special Reference to Prenatal Enamel Defects*

By L. PIERCE CLARK, M.D.,
and CHARLES E. ATWOOD, M.D.,
New York.

Many eugenists, some medically trained and others but psychologically skilled, have advanced a theory that mental defect is an hereditary disease. Such investigators hold that mental defectives beget mental defectives in a fairly large percentage of instances, about seventy per cent. in all material studied. Autopsy findings not ordinarily encountered as a sequence to transmissional neural defects have cast some doubts upon the scientific accuracy of the hereditary view. Histopathological lesions on the whole have been of a distinctly inflammatory or hemorrhagic nature. These autopsy findings and the hereditary germ plasm defect theory need to be harmonized if we are to arrive at a just evaluation of the several causes of feeblemindedness.

It becomes an increasingly difficult task to apportion the precise rôle which the various factors play in the etiology of feeblemindedness. If we might postulate defective stock (and that only in a given case), the matter would be simple; but the picture is often complicated by the vicious presence of alcohol and venery in the ascendants, a prenatal history of extreme malnutrition, or a maternal infective fever and an irregular parturition. So we must apportion the etiology as best we may. The issue is not alone of eugenic importance, but has far reaching social and medical values. Many parents bring their mentally defective children to the consultant to ask whether additional offspring may be similarly afflicted. If the physician is fairly able to apportion the etiological factors, the parents may be much relieved in consequence. In brief, it adds to the specificity of diagnosis. Educational training in developmental therapeutics is also at stake. As regards the latter, hardly any neurologist would pretend to have much hope of a radical betterment in the hereditarily feebleminded; but he might entertain a much different prognosis for inflamed or damaged brain structures not handicapped by inheritance. Psychasthenists are signally at fault in their nonvariant treatment of the two kinds of feebleminded etiologically classified. It may be just possible, on the other hand, that the acquired feeblemindedness may be of a more severe grade and more handicapped by inflammatory or hemorrhagic processes; even so, it cannot be gainsaid that the manner of therapeutic approach in the two types should be different at different stages of the training treatment. We think an expression of opinion upon this point by neurologists and psychiatrists might be worthy of the attention of those specifically concerned in the training of the feebleminded.

THE HEREDITY FACTOR VS. INTRAVASCULAR LESIONS, ENDOCRINE INSUFFICIENCY AND OTHER FACTORS.

There is a consensus of evidence that children with varying degrees of defective mentality spring from stock tainted with neuropathy. This latter term, used in its most divergent sense, includes mental defects, psychoses, psychoneuroses, and even tics and neuroses. Moreover, some would include all cases of organic brain disease, while others would not omit criminal and antisocial impulses and eccentricity, including marked defects of character, offset or not by unusual gifts. By including every possible element which might be listed under the term "neurotic ancestry," and by limiting the inheritance to one or a few near relatives, it is possible to increase to a very high mark the percentage of heredity thus understood. The degree of elasticity granted to the ancestry is also permissible in the descendant. He himself may range from extreme idiocy to the type of mental defect which is appreciable only by delicate psychometric tests.

Many attempts have been made to standardize heredity and to classify its different types. The material may be limited to the idiot and the dependent imbecile, leaving out the moron and debile;

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*Read before the New York Psychiatrical Society, December 7, 1921.

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while the heredity may be limited to the cases of mental defect in the ancestry, or there may be the requirements of crossed neuropathic heredity or a minimum number of cases of neuropathy in the ascendants. In this way the heredity percentages may be cut down to a given number, as twenty-five or even less. Individual experience may be out of all harmony with averages. Thus one authority, Douglas Hunter, asserts that he has yet to see a case of mental defect in which one or both parents did not show departure of some kind from the normal. This experience, however, is extremely unusual.

The statistical method as pursued by the eugenists may be open to criticism. The professed statistician is very critical of the work of all amateurs, however great their prestige and experience. The former would doubtless point out that while one ascendant, direct or collateral, may have one weakminded child, this child may not have been born until after the birth of many normal children. Another ascendant may have begotten or given birth to only one or two children. How can any material include such discordant members? Who can say that if a couple could procreate a sufficient number of children, that one of these might not exhibit some degree of mental defect? If the inheritance of the latter is Mendelian, it could hardly be expected to crop out unless the ascendants had a certain degree of fertility.

The statement has been made that mental defect never appears in sound stock as a mere sport. There is no way of making good this axiom. No one denies that mental defect may be due to some intravascular lesion which may date back much farther than parturition and in fact as far back as the embryonal period. There is no way in which this last statement can be disproved. In regard to the mooted question of the effects on the mentality of the child of protracted labor, forceps cases and asphyxia neonatorum, statistics show the greatest discrepancies—from four and even less to as high as thirty-three or more, a convenient average being eighteen. Naturally the lower figures given are not higher than those of controls, while some of the higher seem considerably superior to control material. But if we follow Weygandt we shall abandon the attempt to prove by figures that difficult labor is a notable factor in the genesis of mental defect. To have produced mental defect it should be necessary for labor to set up some definite intravascular process—hemorrhage, thrombosis, or other condition. In order to determine the presence of actual lesions, autopsies on defectives would have to be invoked. In this province we find only a statement that about twenty per cent. of the lesions found in these subjects are of intravascular origin while the rest are agenesic. Such figures can apply only to gross lesions, presumably in the more marked types. We have no data as to microscopic lesions, nor to defectives in whom no alterations can be brought to light. The difficulty of interpreting minimal lesions is well known and it is doubtful whether a consensus of opinion could be reached. Certainly in theory, intravascular lesions can give rise to agenesia. The claim is made that porencephaly itself may be of inflammatory origin although there is a compromise view which maintains the existence of an inflammatory pseudoporencephaly which is quite distinct from the agenesic type.

In theory all mental defect which is purely inherited should be agenesic, while if the germ plasm was intact in the fecundated ovum the mental defect must be attributed to intravascular lesions due to traumatism or infection. Such a causal factor present in the embryological or early fetal period should itself be able to cause arrested development. The prospect of dissociating the two components in the individual case, and in defectives as a class, is therefore dubious. The true function of the practical eugenist is to prevent the marriage of mental defectives for the reason that such individuals have the tendency to procreate their kind. But after the defective is once born and recognized it does not seem to lead anywhere if we show that he is born of a tainted family. Even if this is true there is no way to be sure that his defect is not due to something accidental. The record of a few cases of accidental defect in a family could unjustly taint the whole stock.

Some writers on mental defect refuse to commit themselves to making any distinction between antepartum and intrapartum origin on the one hand, and postnatal origin on the other. During early extrauterine life some accidental factor—a trauma or infection—may have been sufficient to cause an actual intracranial lesion. A certain amount of backwardness in the early months is no criterion of future mental defect. Doubtless in not a few cases of alleged congenital or inherited defect the mischief is postnatal, although the converse is more apt to be the case and masked or ignored heredity may be set down to falls or infantile convulsions.

In theory the presence of stigmata of degeneration should be of extreme value in segregating the inherited case from the acquired. The percentage of stigmata in mental defect corresponds closely to the percentage of neuropathic heredity. But a close comparison will show that the two percentages cannot be superposed. Goddard concedes that the high grade imbecile and moron are often quite free from stigmata of degeneration. From another angle the socalled stigmata may not be a coexpression of some arrest of neuronal development. Some of them, at least, are sufficiently explained by intrauterine pathology. The same unknown intravascular processes which interfere with the development of the nervous centres may conceivably affect other somatic structures.

But the inherited and congenital factors in mental defect may be visualized in a different way. In place of a blanketlike inheritance special factors may be studied, and especially two—alcohol and syphilis. Both these race poisons may act originally on the germ plasm, or the latter may have been normal and the action may not be exerted until the period of gestation when the mother may contract the disease or alcoholic habit. Moreover, either of these factors may be superadded to a general neurotic inheritance. Mental defect from alcoholism in the ascendants is a clean cut issue which has a foundation in animal experiment. The progeny of alcoholic ancestors shows a highly polyvalent inheritance which comprises everything under neuropathy, degeneration, physical inferiority, and other pathological conditions. It is impossible to show whether the neuropathic children of a man addicted to alcohol owe their neuropathy to the sire, or to the germ plasm which he himself hands down. His own alcoholism may have been an effect rather than a cause. Since it is usually the father who is alcoholic, the entire question of parental inheritance comes up. In Stockard's experiments on guineapigs some dealt with paternal transmission, the females being intact. In one set of experiments the males were made to inhale alcohol fumes. As a rule the members of the second generation were slightly smaller and nervous as compared with controls. The mischief was not apparent, however, until members of the second generation were bred together and bred with sound mates. The proportion of still births showed an increase, but the most striking effect seems to have been an arrested development of some of the tissues of the eyes—opaque cornea, cataract, and in some cases complete or partial failure of the eye to develop at all. When breeding of defectives was continued, the third generation in some cases showed not only an ophthalmos but even the eyelids were defective. A possible fallacy is associated with the fact that the eyes and eyelids in the first generation suffer considerable traumatism from contact with the alcohol fumes. Stockard, however, has satisfied himself that this accident is not in itself transmissible and that there is some selective action of the alcohol on the *anlage* of the eye. Apparently this behavior of the ocular structures is specific and has not been known to appear either spontaneously or after experiment with other substances—at least none is mentioned. The sex of transmission may be male or female.

The subject of alcoholic inheritance is susceptible of illogical interpretation. Thus the mere fact that one parent is not an abstainer has been made a criterion in statistics intended for prohibition propaganda. The belief in the potency of alcohol in this respect prevails among the laity to some extent. Several leading authorities have data to show that the moderate use of alcohol does not injure the germ plasm. Goddard states that of the alleged cases of alcoholic ascendants in the Vineland material all presented some other factor which sufficiently explained mental defect in the offspring. If there is actually a history of excessive parental drinking there are twice as many feebleminded in the descendants as in nonalcoholic controls. The entire problem is subject to the criticism that the drinking or drunken progenitor may have used alcohol because he was a neurotic or psychopathic. It is a matter for ready verification that while the children of one drunken parent, as in the Jukes family, may beget a progeny containing many defectives, the progeny of another drunkard may exhibit no taint of the sort. At one period the subject of paternal heredity was left open, but it was stated that maternal and crossed inheritance was very apt to produce defective children; while if the mother was a habitual drunkard, drunk at conception and through gestation, the infant could hardly fail to be structurally damaged. The fact must not be overlooked that a drunken mother can expose the unborn or newborn infant to ordinary traumatisms. She may undergo severe injuries while intoxicated, her resistance to infections is weakened, she is more likely to suffer from hemorrhage, and other conditions. But alcoholic gravidæ show no special tendency to abortion although still birth is more common than in controls. We find the general statement that alcoholic mothers produce undersized and sickly children who are predisposed to disease.

That alcohol engenders any particular type of mental defect in the progeny of drunkards, or has any special mechanism, is far from true. In these children we may see all forms of idiocy, imbecility, neuropathy, and degeneracy. Hydrocephalus cases are found and epilepsy is especially common among them. The accidents attributable to alcohol run the same gamut as those in families without alcoholic abuse in which simple heredity is accused.

In order to appreciate the difficulties of isolating the agenesic from the accidental factor, the condition microcephalus would seem in theory to be essentially one of arrested development. Weygandt points out, however, that this condition can be the result of encephalitic processes. This was shown by Stark as far back as 1875. The agencies which directly injure the germ plasm and in theory induce arrested development are the very ones which lower the resistance to germ infection; and as long as this is the truth it will be difficult if not impossible to distinguish between the results of agenesis and intravascular mischief. We must think both of an agenesic microcephalus and an encephalitic type.

In anencephalus fetuses, where the cerebrum is rudimentary, the mechanism is not a refusal to develop, but the operation of such general factors as hydrocephalic pressure and amniotic adhesions. Weygandt points this out in the attempt of Hammarberg to differentiate between the different grades of idiocy and imbecility by the period of arrested development of the cortex, that the plates show plainly the evidences of past encephalitis. The microgyry of authors, an alleged agenesic defect, has been shown to depend on encephalitis and meningitis.

In the celebrated Becker family of microcephalus children there was nothing in the ancestry to illuminate the phenomenon. Of nine children, five were microcephalic; three who grew up were idiots. Here one might feel sure of endogenous defect but in at least one case there were inflammatory alterations. There was a possible clue to the mechanism in these cases which is not found in literature. In the fourth month of the microcephalus gestations the mother had invariably been very restless. It is suggested that some toxic principle generated by the mother—and possibly akin to those which cause the various toxemias of pregnancy—may have been formed which was prejudicial to fetal development. Pilcz reported a family which comprised four microcephalic boys and six hydrocephalic girls. One of the latter grew up and gave birth to four children with mental defect.

To render the subject more confusing there have been individuals of normal mentality with defective brain structure.

If we eliminate the familiar types of mental defect with selfevident gross lesions a study of the other clinical forms should be instructive. The subject with mongolism presents striking somatic changes. The structure of the brain is in part agenesic, the convolutions being of the embryonal type with histological departures, but Bourneville reports a case with meningoencephalitic adhesions. Weygandt is not sure that mongolism is not primarily a dysglandular infantilism. This view would place the blame for arrested development on the endocrine glands. The brain development is said to resemble closely that of myxedema and cretinism. Weygandt therefore creates a large family of glandular infantilisms in which presumably there is an infantilism in the cortical development. In such cases intravascular lesions, traumatism, infection, etc., as well as neuropathic inheritance should recede into the background.

The rôle of syphilis in the production of mental defect involves, like alcoholism, a special form of hereditary transmission and special mechanisms. The small percentage of Wassermanns in asylums is evidence that as a direct infection the disease plays no great rôle. A positive Wassermann of itself is insufficient to enable us to speak of syphilitic mental defect. But aside from this, syphilis often is responsible for infantilism and arrested development.

To sum up, the admission that in mental defect there is a notable percentage of neuropathic cases in the ascendants throws no light on the mechanism involved. It does not exclude the possibility that in the individual case the mechanism is toxiinfectious or traumatic. The hereditary component may be quite unlike what we suppose. The belief in an underlying arrest of development cannot be visualized. We can understand a secondary arrest but not a primary one. The greater the defect as in anencephalus the greater the likelihood of an exogenic factor. At the present day we can only visualize arrested development in the simple sense of the word as an infantilism of the brain in which the mechanism is endocrinous. In addition there is the possibility, hardly as yet agitated, that something akin to growth vitamines may be lacking from the nutriment. Some of the aminoacids formed by digestion are known to be more than foods—they are necessary to growth and development. The infant must depend wholly on the maternal organism for its vitamines and other growth determinants. The date at which it begins to manufacture its own hormones is probably not known, but at the outset of gestation these, too, must be of maternal origin. Again, the pregnant woman is known to manufacture substances which may be highly toxic to herself and presumably some of these may be toxic to the fetus and inhibit its development. These metabolic anomalies may be transmissible by heredity. It would seem that the future would have to take more cognizance of this element in the causation of mental defect. Bullard found a surprisingly high percentage of intrauterine disease in the mothers of his mental defectives.

In the study of accidental causation it is especially difficult to assess the rôle which the fetal intrauterine life plays in the amential picture. Gross lesions have been fairly worked out by a host of workers including Kundrat, Heschl, Strümpel, Féré, Bourneville, and others. But the more vague and insidious alterations in the developing fetal brain induced by nutritional disturbances which the mother suffers during gestation have not been properly approached. Of late the experimental induction of transmissible brain defects has opened the question whether the defective germ plasm theory is the correct one for even a large number of the feebleminded. The work of Stockard and others are instances in point. The following excerpts are from an article by Stockard appearing in January of last year, which bear directly on our subject (1):

All types of monsters are developmental arrests. The type induced experimentally depends on the particular moment or moments during which the developmental rate was reduced. The study of the growth influences of one embryonic organ on another is one of the most important problems in the analysis of structure. The egg probably has a definite coefficient of metabolism dependent upon the interaction of its specific chemical structure and the given environment in which it normally develops. The means of interrupting development seem to reside entirely outside the egg itself. They are properties of the environment. Changes in the supply of oxygen would seem to be the most probable cause of interrupted development in the rare cases of this phenomenon among mammals. That organ developing at the most rapid rate or having the highest degree of metabolism or oxidation at the time of the stop is less able to initiate its original rate when the moment of resuming development occurs than are those parts that were developing more slowly. No developmental environment in nature is constantly perfect, and this fact is the underlying cause of the frequently occurring malformation and monstrous productions.

Among the abnormalities in fishes produced experimentally by Stockard were double headed and double bodied and twin individuals; single individuals with various eye defects, malformed brains, mouth deformities, abnormal otic vesicles, etc. Embryonic stages of development, he states, are passed through at a specific rate. This rate is not uniform throughout development. Periods of rapidity alternate with periods of slowness or quiescence.

Mott considers feeblemindedness as a terminal stage following psychoses in ancestors. Rosanoff, Orr and others say that feeblemindedness is not related to insanity and they support entirely the Mendelian law.

In regard to the pathology of feeblemindedness it may be considered an imperfect or arrested development of the cerebral neurones. This arrested development may be faulty in nature or due to disease. The pyramidal cell layers are affected. Sclerosis occurs in twenty-five per cent. There may be found softening, porencephaly, hydrocephalus, microcephalus, inflammatory conditions, cysts, exudative lesions (Southard).

In his report on the examination of one hundred brains of feebleminded children, Wilmarth calls attention to the comparatively large number of cases of actual cerebral disease, in contrast with the relatively small number where imperfect development seems the causative agent of the mental defect. The conditions he found in seventy brains were as follows:

Sclerosis with atrophy	12
Sclerose tuberense	6
Diffuse sclerotic change	7
Other degenerative changes	15
Hydrocephalus	5
General cerebral atrophy	2
Nondevelopment	16
Infantile hemorrhage	1
Old meningitis	3
Angioma	1
Glioma	1
Porencephaly	1

In the remaining thirty cases actual disease or imperfect brain development was not demonstrated, but six had hypertrophy of the skull, two recent softening, two were demimicrocephalic and two showed large simple gyri and were overweight.

The eye has been examined to see what defects in the brain development would be manifested in the optic nerve and retina. The following observations were made by Cohen and Clark: But nine of twenty-nine feebleminded examined showed normal fundal appearances. Pallor of the temporal half and edema of the nasal half of the disc were present in seven cases. Two patients showed slight indistinctness of the disc and one wellmarked neuritis. Evidence of an early stage of atrophy was found in six cases. Dilatation of veins was seen in four cases. Of twenty-four imbeciles, fifteen had normal eyegrounds. Only four patients showed pallor of the temporal half and edema of the nasal half of the disc. One patient showed wellmarked atrophy. In fifty-five idiots only two had normal fundal appearance. Temporal pallor and nasal edema was seen in thirteen cases. One showed general congestion of the entire disc, eight presented a generalized pallor of the discs. Optic atrophy was present in three cases. One patient showed dilated veins, another choked disc, another thrombosis of the central vein, another retinal congestion, and another retinal hemorrhage. No specific cause could fully account for the degenerative changes in the optic discs of idiots. The study showed that there is probably a well marked tendency to neural as well as psychic degeneration in the majority of all grades of idiots. Unfortunately the changes noted here can give essentially no clue as to the provoking agent—inflammatory, hemorrhagic, accidental, or other causes, that may have produced the conditions in the eye in the more marked instances of mental defectives, so that while the imperfections in the development of the eye is the real criterion of the probable imperfect development of the brain it furnishes no clue as to the exact etiological factor inducing the same.

PRENATAL ENAMEL DEFECTS IN THE FEEBLEMINDED.

Largely promoted by a desire to note whether there may not be some means of determining or registering grave metabolic or infectious processes which have existed in the mother, or factors in some way accountable for a part of the mental defects shown in the afterlife of the offspring, a study of enamel defects has been undertaken. It occurred to one of us (Clark) that inasmuch as the enamel is such a unique tissue of the body, and also from the fact that enduring defects occur in it *during its formation,* it might be worth while to see if such registered defects connoted a parallel injury to the nervous system during the supposed metabolic disturbances which produced them. Our study of abnormal enamel formation in the feebleminded was entered upon partly on account of the fact that little or nothing relating to the subject is found in the literature; and partly from a preconceived idea that it would be commonly met with and perhaps be of biological and etiological importance.

One of the latest writers on stigmata of degeneration in the feebleminded (Barr) speaks of "notched or furrowed teeth as due to inherited syphilis, common to all grades." Our investigations, however, were not of syphilitic teeth but of a peculiar hypoplasia thought to be due to other causes.

It is maintained that syphilitic infection has a faculty of producing enamel defects through metabolic disturbances in the embryo. Stein supports this also but states that nonsyphilitic hypoplasia of the teeth has been observed in the bull and the dog, as well as in man, depending on some local accident or affection, and in such cases does not have the marked characteristics of a syphilitic hypoplasia. The great importance of examining for heredosyphilis in enamel defects, however, is recognized.

Howe, of Boston, effected decalcification in guineapigs with diet deficient in vitamines and obtained subsequent calcification in the same animals by adequate diet. At times he was even able to mark the enamel in this way. His efforts to mark the teeth during pregnancy, however, were not successful.

Zilva and Wells found degenerative changes in teeth of guineapigs fed on a scorbutic diet. May Mellanby produced irregular teeth in puppies by rachitic feeding. Dick found hypoplasia in eight and a half per cent. of 281 poor class, and five per cent. of 122 good class school children of London. Chalky enamel, however, was seen in twenty-eight and a half per cent. and nine per cent. respectively.

We must digress by giving a short résumé of the process of enamelization and its significance.

All writers agree that the enamel differs from all other calcified tissues. Histologically, histogenetically, physiologically and morphologically it stands alone. It is the only calcified tissue derived from the epiblastic layer while all other calcified tissues arise from the mesoblast. Imperfections in its structure, occurring during its formation in the embryo, are said most likely to be produced by systemic conditions in the mother which affect epithelium, as, for example, eruptive fevers. Scarlet fever is most pronounced in causing epithelial loss and sometimes produces pitted teeth or hypoplasia of the enamel.

After the production of the enamel has been completed by epithelial cells these are lost and destroyed and enamel can then be changed only by chemical and physical action of its environment. There is no basis of comparison between pathological conditions of enamel and pathological conditions of bone or other calcified tissues formed by connective tissue as the latter continue to remain in vital relation with the system.

Legros and Magitot first investigated the development of the teeth about 1865. In a table published by them they state that the period at which the enamel organ for the temporary teeth first appears is from the seventh to the eighth week of fetal life; and for the permanent teeth about the sixteenth week. The period for the second molars is placed at the third month after birth; and for the third molars at the third year.

It may be noted in passing (2) that the ectoderm furnishes the following tissues of the adult: Epidermis and derivatives (hair, nails, glands); the conjunctiva and lens of the eye; sensory epithelia of the organs of special sense; the epithelium of the mouth; the enamel of the teeth; oral glands; the hypophysis; epithelium of the anus; epithelium of the distal urethra; epithelium of the amnion and chorion; the nervous neuroglia, and chromaffin cells of the nervous system; the smooth muscle of the sweat glands and of the iris; and the notochord. As regards brain embryology, it is known that during the first two months of fetal life the cortex remains thin and differentiation is slow. At eight weeks neuroblasts migrate from the ependymal and mantle zones into the marginal zone and give rise to layers of pyramidal and other cells typical of the cerebrum. Differentiation of these layers is most active during the third and fourth months but probably continues until after birth. From the fourth month the cerebrum thickens rapidly. Myelination begins shortly before birth.

Preparation for the development of the enamel, then, begins at the end of the second fetal month, from the oral, i. e., ectodermic epithelium. The completed enamel organ consists of four layers of cells. Calcification is from the internal layer of epithelium cells. The dentine papilla assumes the form and extent of the future tooth crown and occupies the concavity of the enamel organ. The enamel ultimately gives the detail of crown form.

Preparations for the calcification of the deciduous teeth are begun about the fourth fetal month. Calcification of the deciduous teeth ends at two months after birth. The change takes place within the substance of the papilla whereby it is altered from an organic to an inorganic substance.

One author states that previous to the time of birth the teeth appear to be little disturbed by certain morbid conditions which might be present in the parent and from their earliest inception up to this period their development proceeds with but little interruption and with much regularity.

According to various dental authorities, Noyes, Broomell and Fischelis, Burchard and Inglis and others, hypoplasia of enamel is a disturbance in structure caused by an arrest or perversion of the function of the enamel forming tissue during development; that it is especially likely to follow infectious diseases that affect the epithelium, such as scarlet fever or measles; but it may be caused by any diseased condition which is serious enough to produce marked disturbance of nutrition.

When hypoplasia occurs prenatally, from whatever cause, there are all grades of manifestations of the condition in the permanent teeth, from a slight disturbance in the formation or structure, to complete loss of a portion of the tissue. In all cases the portion of the tissue which was being formed at the time of the disturbance shows a modification of structure. In strongly marked cases the enamel is formed for a time and when formation begins again the new formation may be telescoped onto the old. The entire crown may be shortened and stunted; the surface of the tooth may present grooves the depth of which is dependent on the duration and severity of the disturbance. The grooves are accompanied by pits. White spots may appear. The latter and mottling are more common in certain geographical areas. Mottled teeth, according to McKay and Black (3), were found to occur only in individuals residing continuously in certain geographical areas during the years of the enamel formation. White flecks, brown spots, or even shallow pits were found, and the water supply in those localities was looked upon as a causative agent.

The enamel organ, springing as it does from the ectoderm, the same as the nervous system, is laid down for the temporary teeth, we have seen, from the seventh to the eighth week of fetal life, and for the permanent teeth about the fourth month; although that for the second and third molars may be formed as late as the third year. Infection accidents to the mother or the young child may be registered therefore in the child's enamel defects anywhere from the second month of gestation to the third year of age—a fairly long period of infection registry.

As a preliminary study, we made the following observations at the New York City Children's Hospital and School, Randall's Island, with Gladstone Goode.[1] Three hundred and eighty patients were examined. These ranged in grade from lowest idiocy to highest moron. Particular attention was paid to the first permanent molar, which is the only permanent molar whose enamel organ springs directly from the dental lamina in the same way as those for the temporary teeth. Among children of all grades under the age of the appearance of this tooth no abnormal enamel formation was discovered. In older children and adults our statistics were found to be as follows:

Out of sixty-eight male lowgrade idiots over fourteen years of age, fifty-four had normal enamel, ten had teeth too poor to permit diagnosis and four had pitted enamel. Out of 103 low grade idiot females over fourteen years of age eighty-eight had normal enamel, eleven had teeth too poor to permit diagnosis, and four had defective enamel. Eleven epileptic girls between six and twenty years showed normal enamel. All epileptic boys over twelve years showed normal enamel, out of forty-one examined, except one, whose teeth were too poor to permit diagnosis.

Among the higher grade patients, however, especially among the high grade feebleminded, a considerable proportion had defective enamel. Sixty-nine feebleminded women from fourteen to fifty-five years of age were examined and fourteen showed defective enamel. Among these were several colored girls all of whom had defective enamel except one.

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[1] The authors wish to acknowledge the kindly and helpful assistance of Gladstone Goode, D.D.S., in the examination of case material embodied in this study.

The defects discovered were found mostly in the crown of the six year molar and in the incisors and cuspids. They comprised a striation, pitting, diminished enamel and sometimes complete loss.

Among the paralyzed young children, of fourteen inmates examined, eleven had normal enamel; one had indefinitely shown white spots at the tip of the central incisors; one had Hutchinson's incisors; one deficient enamel, white spots, pitting and absent incisors.

A microcephalic and a macrocephalic child were both normal as to enamel. A microcephalic and two paralyzed epileptics among the low grade idiot children had normal enamel.

Among male morons from sixteen to fifty years of age, out of twenty-four examined, twenty-one had normal enamel, two had teeth too poor to permit diagnosis and one had enamel unformed throughout.

Out of twenty-five feebleminded school boys between the ages of twelve and sixteen years twenty had normal enamel; five had pitted, unformed or grooved enamel. Three of these boys were colored and one of the three had pitted enamel.

An attempt was made to ascertain the condition of the mother during the pregnancy of those patients with defective enamel. This, unfortunately, yielded few positive results owing to many drawbacks in collecting the data. No record of the condition of the mother could be obtained in sixteen cases. In three cases the condition of the mother during pregnancy was said to have been good. The mother of one patient was said to have been alcoholic and "out of her head"; one mother died of consumption; four were considered to have been in perfect health; one had edema of the lower extremities and of the hands during the period of gestation; one was considered not to have been strong; one committed suicide after childbirth by drowning; one was definitely insane; one was said to be immoral and deserted her child.

As a general summary, in the 380 mental defectives examined, surprisingly good enamel was found in nearly all patients of whatever grade, including idiots and imbeciles in whom we found scarcely any instances of enamel defect. Among epileptics, microcephalics and diplegics we found no cases. Hypoplasia was found in the largest percentage, seventeen per cent., in the higher grade mental defectives, i. e., the moron and feebleminded, and a disproportionate ratio was noted among colored girls. The character of the hypoplasia for the most part was pitting and striation.

The Wassermann report in all of the cases of defective enamel was found to be negative except one and that was reported as weakly positive.

SUMMARY.

1. While there can be no doubt that defective enamelization of the teeth is the register of a gross teratological fault, we do not know whether this is a metabolic or a developmental defect in the broadest sense or partly the result of a coexistent infection process in the mother or fetus at the time of the defective enamelization. Probably the strict accountability of infection as a cause of the fault cannot be long maintained, not only from our few data but upon general histopathological grounds. 2. Whichever, or both, of the forming causes are held, certainly the injury to a perfect enamelization is not coincidentally registered in neural tissue of the brain. Defective enamel in a questionable feeblemindedness is therefore not of immediate diagnostic moment as far as the possible coincident injury to neural tissue is concerned. 3. The metabolic and infectious cause of defective enamelization still remains obscure.

In conclusion we would like to urge for general discussion: 1. To what extent is feeblemindedness exclusively hereditary? 2. If brain lesions are present in such a large majority coming to autopsy, are such tissues of etiological moment in the causation of the mental defect or are they but secondary to the symptomatic pathology of the gross picture of the disorder? 3. What are the gross teratological defects in feeblemindedness of diagnostic moment?[2]

REFERENCES.

1. Stockard: *American J. Anatomy*, January, 1921.
2. Prentiss and Arey.
3. McKay and Black: *Dental Cosmos*, May, June, 1916.

BIBLIOGRAPHY.

Kelynack: *The Mentally Defective Child*, 1915.

Hope, E. W.: See Kelynack.

Hunter, Douglas: See Kelynack.

Goddard: Mental Deficiency, *Wood's Handbook*, 1916. *Idem: Feeblemindedness*, 1914.

Weygandt: *Idiotie und Imbecilletät*, 1920, xvi.

Kundrat: *Die Porencephalie*, 1882.

Strümpell: *Ueber die Ursache der Erkrankungen des Nervensystem*, 1884.

Féré: *La Famille Neuropathique*, 1894.

Bourneville. *Bureau d. Progr. Méd*, 1891, xvi, 416.

Tredgold: *Mental Deficiency*, 1914.

Bullard: *Boston Medical and Sur. J.*, May 5, 1904.

Piper: *Zur Aetiologie des Idiotie*, 1893.

Dollinger: *Congenital and Early Acquired Idiocy*, 1921.

Lapage: *Feeblemindedness in School Children*, 1910.

Shuttleworth and Potts: *Mentally Deficient Children*, 1910.

Stern, A.: *Journal A. M. A.*, August 4, 1917.

Prentiss and Arey: *Embryology*, third edition, 1920.

Magitot, E.: *Traité de la Carie Dentaire*, 1867.

Noyes and Thomas: *Dental Histology and Embryology*.

Burchard and Inglis: *Dental Path. and Therap.*, 1920.

Broomell and Fischelis: *Anat. and Histology of Teeth.*

Barr, M. W.: New York Medical Journal, July, 1920.

Howe, P. R.: *Journal of Dental Research*, March 1921.

Mummery, J. H.: *Microscopic Anatomy of the Teeth.*

Zilva and Wells: *Proceedings of Royal Society*, xc.

Mellanby, May: *Dental Record*, xl.

Wilmarth, A. W.: Report on the Examination of 100 Brains of Feebleminded Children, *Alienist and Neurologist*, 1890.

Stein, J. B.: *Dental Cosmos*, July, 1913.

Dick, J. L.: Abnormal Conditions of Enamel in Cases of Malnutrition, *Dental Record*, 1918.

Clark and Cohen: A Study of the Eye in Mental Defectives, American Medical Association, April 16, 1910.

Stockard, Charles R.: Developmental Rate and Structural Expression, etc., *American Journal of Anatomy*, January, 1921.

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[2] It would seem more than likely that some reason for the effort to establish mental defectiveness as a hereditary defect of germ plasm either solely or predominatingly has been due to the fact that the care and training of feeblemindedness in the past as at present have been entrusted to laymen. Psychologists and teachers and individuals ungrounded in medical knowledge have apprehended that the subject in which they have been interested is largely an educational or psychological one. It is but natural that when they look for the real etiology of their problem that it would be found in a field allied to their own and in which medical issues as such play but a secondary role. The most active workers and believers in the inheritance of feeblemindedness have been recruited from lay individuals. We are aware that many critics might with some show of logic maintain that the opponents to the heredity theory are physicians and those, perhaps, not especially skilled in psychology or pedagogically trained in a broad sense.

[The discussion of this intensely interesting paper will be found in this issue of the Journal on page 643.—Editor.]

A Group of Cases Illustrating Diagnostic Difficulties During an Epidemic of Acute Encephalitis*

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During the prevalence of an epidemic, cases are encountered which are difficult to differentiate from, or to be recognized as, the disease then prevalent. The recent experience with acute epidemic encephalitis offered no exception to this rule. During the early period of an epidemic many physicians fail to diagnose the disease, either because they are not aware of the existence of the epidemic or because the disease is of a mild form, or because the typical symptoms are missing. When the epidemic reaches its height, and clinicians become familiar with its various clinical manifestations, the tendency to diagnosticate as such all cases bearing a resemblance to the disease becomes more pronounced. Especially is this true of cases in which other etiological factors can not be ascertained. The establishment of a correct clinical diagnosis is frequently impossible, and the true nature of the case can be ascertained only by a careful study of the pathology of the brain and cord.

Syphilis of the central nervous system, tumors of the brain, and tuberculous meningitis were three conditions which caused especial difficulty in diagnosis. The following cases will serve as illustrations:

Case I.[1]—M. B., aged fifty-nine; admitted January 15, 1921, died January 21, 1921. The patient was a housemaid; her husband had died of general paresis; there were no children. For ten years the patient had had a glandular enlargement on the right side of the neck. She had had a cough, and attacks of vomiting and constipation for a year without pain, melena or hematemesis. During the six months before admission to the hospital, this condition became aggravated, and a glandular swelling appeared also on the left side of the neck. In the spring of 1920, while at another hospital, a lymph node had been removed, a frozen section of which showed a mass of chronic granulation tissue with pronounced round cell infiltration and considerable endothelial proliferation. There were giant cells and rather extensive areas of necrosis. Some areas were suggestive of tuberculosis, but no definite tubercles were present, and no tubercle bacilli were found. The diagnosis of syphilis was made. The blood Wassermann was positive.

A week before admission the patient exhibited general malaise, headache, vomiting, and a temperature of 102° F., together with reddened fauces, slight cough, rhonchi over the chest, and insomnia. The last three days before admission she was semistuporous and the temperature remained at 100° F.; the vomiting was less marked. She was poorly nourished, acutely ill, irritable, and unable to speak. The pupils were slightly irregular, and did not react to light and accommodation. No icterus, petechiæ or palsies were noted. The neck was moderately rigid. Chest expansion was poor and equal; breathing was shallow; the patient did not cooperate. The lungs were clear and resonant, so far as could be ascertained. The heart was of normal size and position; the sounds were of good muscular quality, with a soft, transmitted systolic murmur at the apex. The pulses were equal, slow, and regular, the tension being increased; the radials showed moderate thickening. The abdomen was tympanitic in the upper part, with generalized voluntary rigidity; an indefinite but rather firm, irregular mass, somewhat rounded, was felt deep in the midabdomen. In the upper extremities there was fair and equal power, and a slight clubbing of the fingers; in the lower extremities there were no palsies, deformities, or edema. The knee jerks and Achilles reflexes were absent. Small firm, irregularly enlarged lymph nodes, varying in size from a large pea to a hickory nut, were found in the submaxillary region; also a few in the axillary, and some in the inguinal regions. At the posterior angle of the left maxilla several small glands were confluent and adherent to the skin.

The following were the laboratory findings: Hemoglobin, seventy-five per cent. (Kuttner); red blood corpuscles, 4,800,000; white blood corpuscles, 13,200; polymorphonuclears, seventy-four and five tenths per cent.; lymphocytes, sixteen per cent. No abnormalities of the red blood corpuscles were noted. On January 17th, two days after admission, the patient was more stuporous, the face more flushed, the respiration more rapid, the rigidity of the neck remained unchanged. There was no Babinski or Kernig. The temperature was normal. There was no dulness over the lungs, and as the patient's breathing was very shallow, no râles were heard. The kidney function was normal. The pupils were narrow. Nerve heads were normal. Fifteen c. c. of clear, somewhat flaky spinal fluid were withdrawn under moderately increased pressure; cytology 550 cells, ninety per cent. lymphocytes. The blood Wassermann was reported as suspicious (±); and spinal fluid negative. On January 18th Cheyne-Stokes respiration and a fairly good pulse were noted. A few moist râles were heard at the extreme left base, but no dulness or evidence of consolidation. There was no evidence of lues in nose or nasopharynx. At this time the diagnosis of taboparesis was considered, but encephalitis could not be excluded. On January 20th coarse râles were heard all over the chest, but no definite change or dulness were noted; temperature and respiration had increased; rigidity of the neck persisted. On January 21st pulmonary edema developed and the patient died. A gland excised from the side of the neck after death was found to be tuberculous.

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[1] We are indebted to the physicians of the hospital for the privilege of reporting this case and Case E. F.

AUTOPSY FINDINGS.

Gross anatomy.—There was a moderate amount of injection of the vessels of the pia arachnoid; also some flattening of the gyri of the left dorsolateral surface in the midfrontal region. The pia arachnoid had lost its translucency and was thickened over the entire base of the brain, and to a lesser degree over the rest of the cerebral surface. A few whitish areas, tuberclelike in appearance, were found irregularly distributed over the surface of the cerebrum and cerebellum. There were no apparent macroscopic changes in the vessels at the base of the brain. The cranial nerves were at their origin, imbedded in the thick meshes of the infiltrated meninges. This was particularly true of the optic chiasm and the optic nerves.

Microscopic anatomy.—Sections were made at various levels of the brain stem as well as from various portions of the cerebral cortex and cerebellum. The leptomeninges were markedly thickened and infiltrated with numerous lymphocytes and endothelial leucocytes. A few polymorphonuclear leucocytes, a few red blood corpuscles and fibroblasts were among the elements of infiltration (Fig. 1). The vessels showed marked thickening of the intima, with infiltration of the subintimal space as well as the adventitial space. At places it appeared that leucocytes from the blood stream had made their way through breaks in the intimal lining. This process of perivascular infiltration and intimal thickening could be traced along the course of the cortical vessels. The cortex underlying the meninges presented evidence of degenerative as well as inflammatory changes. Small areas of coagulation necrosis resembling tubercles were found here and there in the meninges over the cerebrum and cerebellum. In addition to the above described changes, the leptomeninges at the base of the brain showed marked edema. In the brain stem there was only a moderate amount of thickening of the adventitia of the smaller bloodvessels, with frequent areas of perivascular edema. Material stained for microorganisms showed the presence of numerous tubercle bacilli in the pia arachnoid.

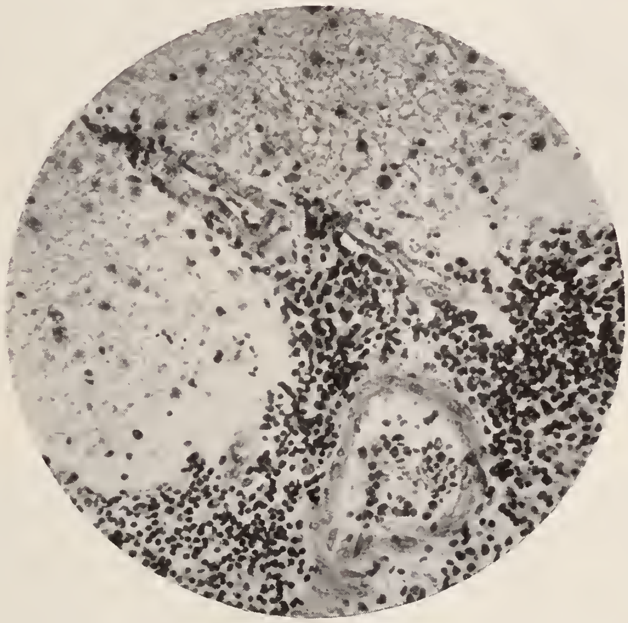

FIG. 1.—Case I. Tuberculous meningoencephalitis. Section of the precentral gyrus, showing marked infiltration of the piaarachnoid. Small lymphocytes are predominating in the infiltration, though macrophages, polyblasts, and a few plasma cells are also encountered. The vessel shows distinct thickening of the intima. Amyloid bodies in large numbers are seen in the underlying cortex.

The clinical picture presented by this case suggested two possible diagnoses: acute epidemic encephalitis or cerebrospinal lues with terminal infection. On the one hand, it must be remembered that the patient entered the hospital at a time when numerous cases of encephalitis were in the wards, so that it was very natural to incline towards this diagnosis. A week before admission the patient apparently manifested an acute illness, with fever, headache, vomiting and insomnia, rapidly followed by semistupor. These symptoms are not at all unusual in cases of encephalitis. The examination revealed irregular, fixed pupils, and lost knee jerks and ankle jerks, all of which have been frequently observed in the tabic forms of epidemic encephalitis. A further reason for this diagnosis was the marked pleocytosis in the spinal fluid and the negative blood and spinal fluid Wassermann. Even in the later course of the disease nothing developed to exclude this diagnosis.

The facts pointing towards the diagnosis of cerebrospinal syphilis or taboparesis were that the husband had died of general paresis, and that the gland excised from the neck of the patient had been reported in another institution as being luetic, and that she had received antiluetic treatment. The clinical symptoms, likewise, could be interpreted in terms of lues. Against this assumption, however, although not absolutely excluding it, was the acute and brief duration of symptoms before admission, the rapid development of a semistuporous state, the presence of fever, and the absence of biological findings in the blood and spinal fluid. The presence of so large a number of lymphocytes in the final fluid in an acute luetic condition with a negative Wassermann also indicated some other infectious agent, although it could not absolutely exclude syphilis.

Tuberculosis was not considered at all. The presence of such a number of cells early in a tuberculous process is uncommon, but not unknown. Had the suspicion of tuberculosis been entertained, examination of the spinal fluid for tubercle bacilli would probably have revealed their presence. On the other hand, no evidence of tuberculosis in the lungs could be ascertained. Pupillary phenomena and lost reflexes are certainly extremely uncommon as an early symptom of meningitis, and furthermore, the acute onset and the rapidity of the course, in a woman of this age without a history of tuberculosis, must be conceded as extremely unusual. The pathological findings in the case, however, make the diagnosis of tuberculosis certain.

This case shows very clearly how difficult it is to make a diagnosis between the three diseases, encephalitis, syphilis, and tuberculosis, during an epidemic of encephalitis, especially without the aid of positive laboratory findings.

CASE II.—A. B., aged twenty-two; admitted April 25, 1921, died April 26, 1921. Ten days before admission the patient had begun to suffer from pain in the head and back of the neck; she vomited twice; there was marked anorexia from the onset. There were no chills, fever, skin eruption, diplopia, ocular palsies, or joint pains. The pain in the head and neck spread to the shoulders and trunk, and finally to the legs. It was then noticed that her right arm and leg became gradually weaker, and were totally paralyzed two days before admission. For the last twenty-four hours before admission she was unable to void.

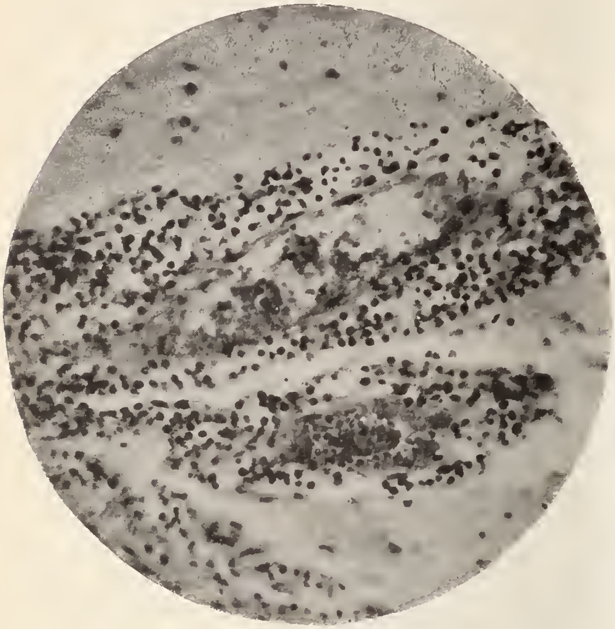

FIG. 2.—Case II. Landry's disease. Section of the medulla, showing two medium sized vessels with small round cell adventitial infiltration. A few plasma cells and an occasional macrophage can be seen in the adventitial space.

She was found to be well nourished and well developed; acutely ill and complaining of abdominal pains. The face and throat and accessory sinuses were negative; the tongue protruded in midline. There was no rigidity or retraction of the neck. The pupils reacted promptly to light and accommodation; the left was larger than the right; bilateral corneal anesthesia was noted; there was no ptosis. The heart and lungs were negative. The abdomen was prominent, chiefly in the lower half, and tender; the bladder was markedly distended. The mentality was clear. There was flaccid paralysis in the right arm and leg, and paresis of the left arm and leg. The deep reflexes were diminished; there was questionable left Babinski. The patient's speech was involved.

The blood examination showed 22,000 white blood corpuscles; ninety per cent. polymorphonuclears; no change in the red blood corpuscles. The temperature rose from 98.4° F. to 102° F. The urine showed a faint trace of albumin and a few white blood corpuscles.

Later in the day the patient was breathing with great difficulty; she cooperated well. All the reflexes were lost, and flaccid paralysis became complete in both upper and the right lower extremities, and almost complete in the left lower. There was a doubtful Babinski sign on the left. Pain and touch sense were intact. It appeared that there was a paresis of the diaphragm. On April 26th there was a divergent squint, and right facial weakness. The tongue could not be protruded. There was marked dyspnea; intense cyanosis; and mild stupor. There was bilateral flaccid paraplegia; sensation was apparently intact. The patient responded to commands, and relapsed into stupor. No puncture was made. Death occurred on the same day. The diagnosis of acute ascending paralysis (Landry's disease) was made.

AUTOPSY FINDINGS.

Gross anatomy.—The meninges and dura were normal; the pia arachnoid was markedly injected and presented several small hemorrhagic areas on the convexity of the cerebral hemispheres. On section the brain substance showed frequent petecheal hemorrhages. The spinal cord was soft throughout its entire length, and on section presented extremely pale and granular surfaces with poor demarkation of its gray and white substance. In the region of the thoracic segments the dorsal tracts appear to have been replaced by a mass of softened tissue.

Microscopic anatomy.—Sections were taken from the various portions of the cerebral hemispheres and also from various levels of the brain stem and spinal cord. The corpus striatum, the thalamus, midbrain, pons, and medulla were also studied. The most frequent findings were the extensive perivascular infiltrations which were most prominent in the region of the medulla and throughout the cervical and dorsal regions of the spinal cord. The migration of the elements of adventitial infiltration into the adjacent

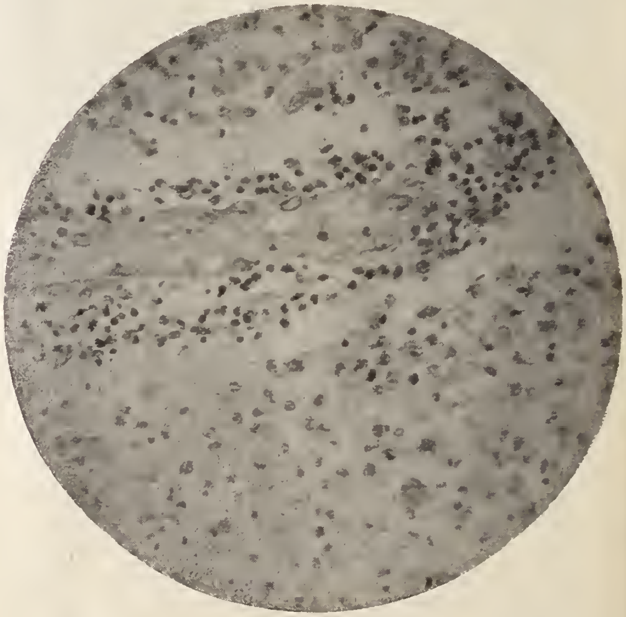

FIG. 3.—Case II. Landry's disease. Section of the spinal cord in middorsal region, showing an extensive area of softening surrounding a vessel with adventitial infiltration. The area of softening is composed of a large collection of glia cells (granular cells), "gitter" cells.

parenchyma was extremely prominent, and gave rise to areas of focal infiltration. These adventitial and focal infiltrations were composed of small lympho[illegible]thelial leucocytes. There were no fibroblasts. Many eosinophiles were seen scattered throughout the zone of infiltration; close to the areas of infiltration were frequently found areas of softening, with numerous granular cells intermingling with small lymphocytes and occasional fibroblasts. These processes of infiltration, proliferation and softening were found side by side, varying in degree, at various levels of the cerebrospinal axis. They were most pronounced in the spinal cord, and the height of this process was reached in the posterior columns of the dorsal region of the cord, where it had nearly completely obliterated the tracts of the posterior column, replacing the latter by an area of softening, with some evidence of reparative change, as shown by the presence of young fibroblasts. The findings in the upper portion of the brain stem, beginning with the pontine region, were the adventitial and perivascular infiltrations, while the process of softening was found only occasionally. Parenchymal changes were seen everywhere in the brain and spinal cord (Figs. 2 and 3).

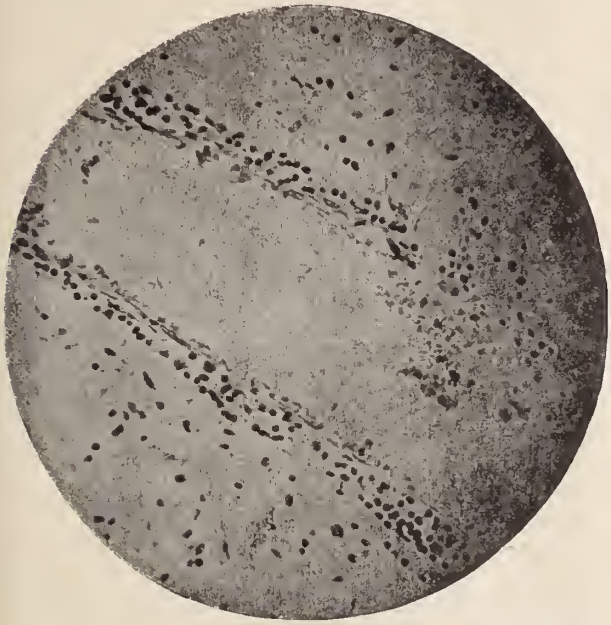
Fig. 4.—Case III. Acute epidemic encephalitis. Section from the optic thalamus, showing a vessel with typical adventitial infiltration. Note the nearly complete absence of plasma cells.

The clinical picture and the pathological findings of this case bear out the diagnosis of Landry's disease, which was made during life. The difficult question to be decided in this case is that of etiology. Cases such as this have been described, and have occurred not infrequently, during an epidemic of poliomyelitis. It has been rare, however, to find such extensive lesions, especially such extensive areas of softening, in poliomyelitis. Nevertheless, the action of the poliomyelitic virus cannot be absolutely excluded. The presence of eosinophiles in great number, such as occurred in this case, would indicate the agency of some other bacterial invasion. The search for organisms in stained sections revealed a small coccuslike body. We are, however, not certain that this body was of bacterial character. No cultures were made of either the brain or spinal cord. The literature of Landry's paralysis is filled with cases which show no lesion at all, or extensive lesions such as described. Various types of bacteria have likewise been cultivated in such cases. The very fact that bacteria of so many different kinds have been cultivated leads one to conclude that bacteria probably plays a secondary rôle. It is more likely that cases such as this are due to an infectious agent of unknown origin. We cannot, from the history of the case, come to any more definite conclusion regarding the etiology.

Case III.—E. F., aged forty-two; admitted February 2, 1921, died February 5, 1921. The patient gave no history of previous illness. She had been married twenty-two years, and had never been pregnant; this the husband believed to be due to his impotency; he had had a chancre eighteen years ago, and had never taken treatment or had a Wassermann test made. The patient gave a history of regular menses. She had suffered with lower abdominal and inguinal pain, on account of which a gynecological operation had been performed a year previously, without benefit. Six months later she was given antiluetic therapy for tertiary lues, at Vanderbilt Clinic, in the form of intravenous and intraspinal injections. Generalized pains throughout the body followed. Headaches became very severe, preventing sleep. Three weeks previous to admission to the hospital, there was a sudden appearance of jaundice, during which time, at Bellevue Hospital, one intraspinous and one intravenous injection of arsphenamine were administered. Six days previous to admission, the patient complained of a gradual diminution of vision, up to almost total loss, and transient diplopia. She suffered from insomnia. She had had a convulsion two days before admission, from which she had awakened without a subsequent

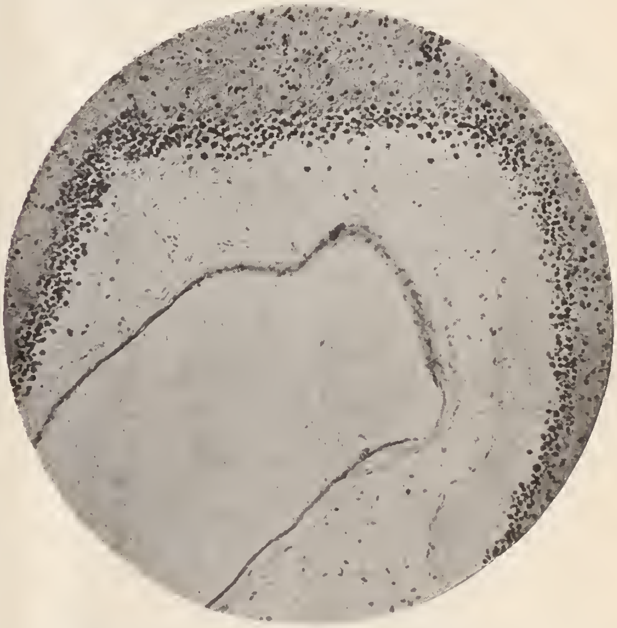
Fig. 5.—Case V. Subacute epidemic encephalitis. Medium sized vessel in the region of the globus pallidus, showing distention of the adventitial space. The limiting membrane is surrounded by a wide zone of accumulated amyloid bodies.

period of unconsciousness, and had then become stuporous; she remained thus until her arrival at the hospital. She was very weak, her voice had been barely audible for five days.

A well nourished, middleaged woman; she was lethargic, but could be roused; slight cyanosis was present; she was breathing rapidly, with forced expiration; she complained of generalized headache. Purulent conjunctivitis was noted; the pupils were irregular and fixed; the patient did not cooperate for determination of ocular movements; there was no evidence of nystagmus; moderate ptosis of both lids was noted. There were no petechiæ. The tongue was coated, protruded incompletely, and did not deviate. Tonsils and pharynx were congested, and covered with mucus. There was slight weakness of both sides of the face, and marked rigidity of the neck, partly voluntary. The lungs were hyperresonant; no râles were heard. Sounds at the apex of the heart were forceful; a soft systolic murmur at the apex was transmitted a short distance to the left; there were no accentuations; the rate was increased and regular; the pulses were equal and regular, and easily compressed; there was no thickening. The blood pressure was 125/80. Power in the arms was poor but equal; fingers were clubbed; there was moderate hypotonia. Power in the legs was poor but equal; there was no Kernig; there were no pathological reflexes; the deep reflexes were bilaterally diminished. The abdomen was negative.

Blood count showed hemoglobin, ninety-four per cent (Kuttner); red blood corpuscles, 4,800,000; white blood corpuscles, 11,000; polymorphonuclears, sixty-six per cent.; lymphocytes, twenty-five per cent.; no abnormality of red blood corpuscles. A lumbar puncture was made, ten cubic centimetres of clear fluid being removed under very slightly increased pressure; cytology forty cells, mostly lymphocytes. Blood Wassermann ++; cerebrospinal fluid .8-1 c. c. ++++. The retinal veins were somewhat distended; fundi were otherwise normal. In the final note made on February 6th, the case was considered to be one of encephalitis lethargica, complicated by the presence of positive Wassermann in blood and spinal fluid.

AUTOPSY FINDINGS.

Gross anatomy.—The gross anatomical findings were limited to a moderate amount of flattening of the convulusions and widening of the sulci of the left frontal lobe; a moderate amount of congestion of the pial vessels and a considerable amount of clear exudate in the pia arachnoid, limited to the frontal regions particularly.

Microscopic anatomy.—The meninges were studied with particular care at various levels of the cerebrospinal axis, and very little change was noted. Only in a limited number of sections was there a moderate amount of distention of the pia arachnoid space with only a meagre amount of infiltration, limited to a few small round cells and a few macrophages, with an occasional fibroblast. The meningeal vessels showed no change whatsoever, aside from a moderate amount of congestion. There was no thickening of the intima, no splitting of the elastica and no infiltration of the adventitia. The larger vessels at the base of the brain were also free from any changes in their various coats. Sections taken at various levels of the cerebral cortex showed no definite parenchymatous changes. The vessels, however, especially in the medullary portion, showed a moderate amount of perivascular infiltration. Sections throughout the brain stem, including the midbrain and the hindbrain, showed numerous extensive lesions, characterized by infiltration of the adventitial layer of vessels, focal areas of infiltration, and occasional areas of softening. The elements of infiltration were mainly small, round cells, endothelial leucocytes and "gitter" cells filled with pigment granules. There was almost a complete absence of plasma cells. Throughout the parenchyma a few mononuclear elements had wandered away or were in the process of wandering out of the adventitial spaces. Rod cells (Stäbchen Zellen), were also frequently seen. The microscopic picture, because of the absence of meningeal involvement, the lack of cortical changes, the rather limited number of plasma cells, and the absence of endarteritis, led to the conclusion that the pathological changes were characteristic of acute epidemic encephalitis, and not of cerebrospinal lues (Fig. 4).

The great difficulty presented by this case was the differentiation between cerebrospinal lues complicated by some acute process, probably also luetic in origin, and acute epidemic encephalitis. If this patient had been admitted to the hospital at the time when the epidemic of encephalitis was not prevalent, it is questionable whether this latter condition would have been at all considered. The history of lues in the husband; the fact that she had received antiluetic treatment before admission, at two reliable institutions, and the physical signs on admission, were sufficient to make a diagnosis of cerebrospinal lues, to which there might have been added an acute, luetic meningoencephalitic process. The jaundice could be explained as a sequel to the administration of arsphenamine. The acute onset, with headache, diminution of vision and diplopia, followed by convulsive seizure and subsequent stupor suggested at one time the diagnosis of acute epidemic encephalitis in a person suffering from lues. This view was based on the occurrences of similar clinical pictures during the height of the epidemic of lethargic encephalitis in cases in which lues was not in question. But we feel in this instance the correct diagnosis could not have been made at the bedside, and was entirely dependent on the histological studies of the brain and cord.

Case IV.—T. D., aged eighteen; admitted November 29, 1920, died December 2, 1920. A week previous to admission, while the patient was at the Polyclinic Hospital, convalescing from a leg amputation which had been done five weeks previously, it was noted that his head began to jerk backward. Four days later the patient became somnolent, partial ptosis of the right eye developed with twitching of the face, diplopia, indistinct speech, and difficulty in swallowing. He was mentally alert when aroused. He was transferred to the Willard Parker Hospital with the diagnosis of poliomyelitis. His condition improved; speech became more distinct. At no time had there been any paralysis of arms or legs although the left arm was somewhat weak, and the right arm tremulous. Spinal fluid and blood Wassermann were negative.

PHYSICAL EXAMINATION.

Physical examination on admission revealed weakness of both facials. The tongue could not be protruded; the mouth did not open more than half an inch; the eyes could not be tightly shut, and there was ptosis of both lids. Pupils dilated, reacted promptly to light; internal strabismus of right eye; corneal reflexes diminished on both sides. The neck was rigid. Hands and arms were weak. Knee jerks and Achilles were present, but no clonus; left knee jerk was somewhat the livelier; no Babinski, no Gordon; atrophy of left thigh muscle; no Kernig.

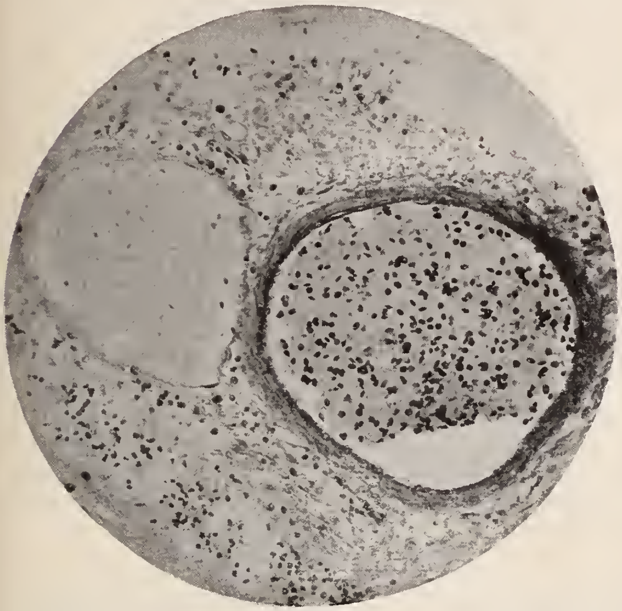

Fig. 6—Case V. Subacute epidemic encephalitis. Artery and vein in the region of the thalamus, showing proliferation of adventitial elements.

On December 1st Dr. Sachs noted the following: "Symptoms and signs point to infectious type of polioencephalitis. Patient cyanosed, dyspneic; pupils dilated, but react to light. No demonstrable ocular palsies; slight facial asymmetry; difficulty in opening mouth; paresis of the left arm. Increase of deep reflexes left side. Throat culture negative for diphtheria." The following notes were made on December 2nd: "Difficulty in swallowing has increased to such a degree that gavage is necessary. Diplopia persists; difficulty in speaking is very marked; temperature has risen to 100.6° F. Cyanosis has deepened; rigidity of the neck has increased markedly." Death occurred later in the day from respiratory paralysis.

AUTOPSY FINDINGS.

Gross anatomy.—The meninges showed only slight congestion, the cisterna magna was moderately distended with clear cerebrospinal fluid. There were only a few delicate meningeal adhesions at the base of the brain. On section, the brain substance showed marked diffuse congestion and numerous small petecheal hemorrhages. No other macroscopic changes were evident.

Microscopic anatomy.—In searching through the cerebral hemispheres and the entire brain stem, as well as the upper portion of the spinal cord, only occasionally were vessels found with typical perivascular infiltration. Numerous perivascular hemorrhages were present; and, still more striking, were the marked destructive changes in the walls of the vessels. This was manifested by the frequently noted ruptures of the vessel walls leading to the extravascular hemorrhages. The staining property of the vessels had been impaired to the extent of giving the appearance of a diffuse hyalinization of all the coats of the vessels. A fairly marked degenerative process was found throughout the parenchyma, with frequent areas of neuronophagia. Accumulations of proliferated glia cells were often seen in the vicinity of smaller bloodvessels.

The clinical picture of this case is that of encephalitis. The jerking movements of the head, diplopia, ptosis, speech affection, difficulty in swallowing, the evidence of meningeal irritation, all point to the correctness of this diagnosis. Furthermore, this case appeared at a time when this disease was epidemic. The striking feature of the case was the rapidity of the progress of the disease. The pathological findings are of special interest, in that the lesion was largely hemorrhagic, with very little evidence of the usual perivascular lymphocytic infiltration, and the marked effect upon the walls of the bloodvessels, which must have been due to a distinct action of the toxin of the disease. We feel that in this disease the organism asserts its primary effect upon the bloodvessels; and that, depending upon the virulence of the organism and its toxin, there occurs either perivascular infiltration, with subsequent involvement of the parenchyma and the ganglion cells, or, as in this case, the walls of the bloodvessels themselves suffer primarily. The extensive hemorrhages and the rapid development of the disease in this case have been due to this latter form of lesion.

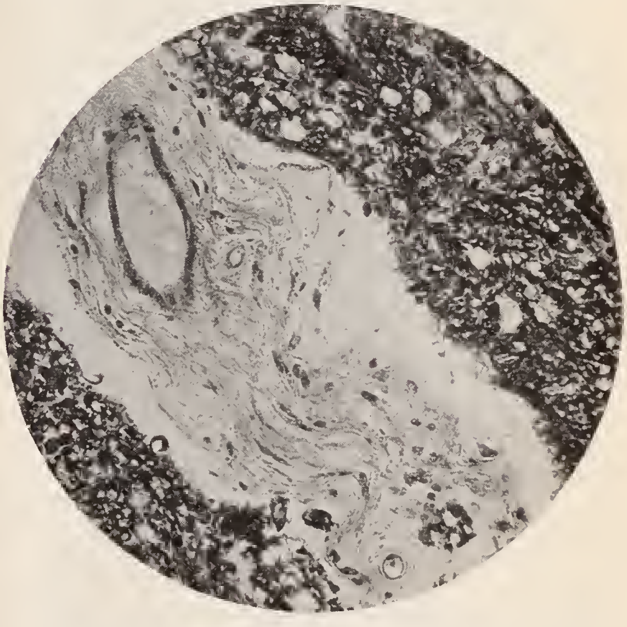

Fig. 7.—Case V. Subacute epidemic encephalitis. Small vessel in the region of the midbrain, showing active proliferation of adventitial elements with formation of young fibroblasts.

The development of the disease bore no relation to the previous operation; nor does the clinical picture resemble an encephalitis due to the poliomyelitis virus, although during an epidemic of this latter disease it would probably have been extremely difficult to have ruled out the possibility of an encephalitic process due to it. As further proof of the correctness of our diagnosis, it is to be noted that a rabbit injected intracranially with an emulsion of the brain of this patient succumbed with paralytic phenomena, and its brain showed not only an occasional perivascular infiltration, but, interestingly enough, showed lesions of bloodvessels and hemorrhages strikingly similar to those found in the case.

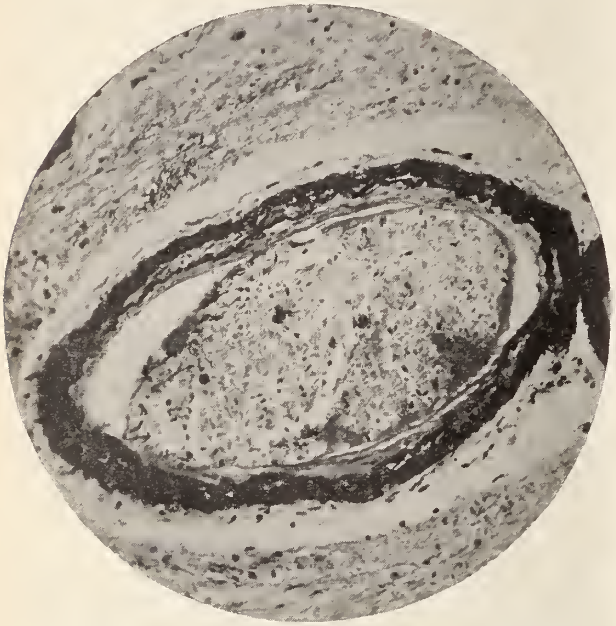

FIG. 8.—Case V. Subacute epidemic encephalitis. Medium sized vessel in region of the dentate nucleus, showing pronounced degenerative change in the media and adventitia.

CASE V.—M. P., aged twenty-two; admitted June 9, 1921, died June 12, 1921. The patient suffered from pain in the lower abdomen, with slight vaginal bleeding, five months previous to admission. Ectopic gestation was suspected, and laparotomy was performed. A bicornate uterus and evidence of early pregnancy in one horn were disclosed. Abortion followed. On discharge from the hospital the patient's condition remained below par. She complained of frequent headaches and blurred vision for four months preceding the onset of the acute symptoms. Two weeks previous to admission she suffered from coryza and cough but remained up and about for a few days, when she had a slight chill, followed by a rise of temperature. She was put to bed, and soon showed improvement; two days later high temperature developed, with cough, severe headache, and signs of pneumonia in the left lung. Attacks of vomiting followed, accompanied by delirium and retention of urine. She became somnolent the day before admission.

The patient arrived at the hospital, comatose and restless. There were no ocular palsies; the pupils were dilated, the left more than the right; neither reacted to light. The eyes rolled from side to side. There was no asymmetry of face or rigidity of the neck. The heart was negative; the lungs showed signs of a pneumonic process in both lower lobes. The abdomen was negative. The extremities showed no paralysis, no Kernig or Brudzinski, but a slight exhaustible ankle clonus, and bilateral Babinski. The blood picture was negative. The urine was negative, except for a very faint trace of albumin. The temperature, from the day of admission to the day of death, rose gradually from 99° F. to 104.6° F. A spinal puncture was performed; clear fluid was removed under normal pressure; it was found to contain eighty lymphocytes to the cubic millimetre.

On the day after admission the patient remained comatose; there was no definite ocular palsy, although there was a limitation of eye excursion to either extreme position. The left pupil was larger than the right, and did not respond to light. The right pupil responded only slightly. Ptosis of the left eyelid was noted, also a slight flattening of the left lower face, but no paralysis of the tongue or palate, and no rigidity of the neck. The knee and Achilles jerks were not very active. Bilateral Kernig and occasional myoclonic movement were noted. The fundi were normal. On the following morning, the patient remaining comatose, Cheyne-Stokes respiration developed and death occurred from respiratory paralysis.

AUTOPSY FINDINGS.

Gross anatomy.—The dura was free from adhesions, smooth and glistening. The pia arachnoid was edematous throughout, but smooth and glistening, except for small areas at the occipital pole on the left side and over the left cerebral peduncle, where it was thickened and opaque. There were a few small opaque whitish granules noted in the Sylvian fissure, which strongly suggested tubercles. The vessels on the surface of the brain were somewhat congested, but no hemorrhages were found. The gyri and sulci were normal. No areas of soften-

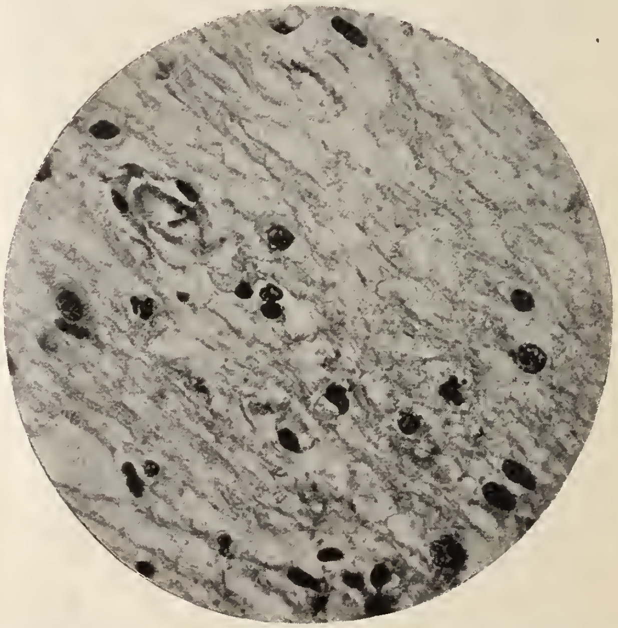

FIG. 9.—Case V. Subacute epidemic encephalitis. Section of the medulla, showing active glia proliferation. Several glia cells with mitotic figures are seen in the field.

ing were noted. The consistency of the brain was somewhat reduced. The cranial nerves appeared normal except for the sixth nerve on the right side, which appeared to be somewhat smaller in circumference than the same nerve on the opposite side.

Microscopic anatomy.—Sections of the cortex, midbrain, and medulla presented uniform histological changes. They consisted of markedly developed thickening of the adventitia of the smaller and medium sized bloodvessels. The adventitia was infiltrated by numerous mononuclear elements, such as lymphocytes, polyblasts, and fibroblasts. The latter were frequently seen growing out into the adjacent parenchyma. Many cells were seen in various phases of cell division. Blood pigment and other products of cell destruction were frequently seen in the adventitial coat of the vessel. In some areas perivascular hemorrhages were noted. In the parenchyma there were numerous instances of neuronophagia and of marked diffuse gliosis. Mitosis of glia cells was frequently noted. The pia arachnoid was thickened and infiltrated with small round cells, fibroblasts, macrophages, and red blood corpuscles in a few areas (Figs. 5, 6, 7, 8 and 9).

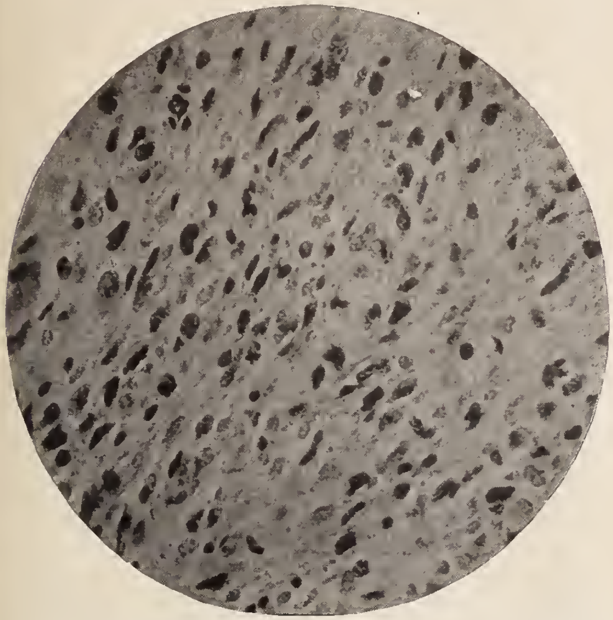

Fig. 10.—Case VI. Spongioblastoma. A typical microscopic field of the tumor mass. Note the fusiform outline of the cells, most of which give off long, fine processes.

The clinical picture presented in this case was that of an acute infectious process in the brain. The patient was delirious, vomited, showed extreme restlessness, slight involvement of the eye muscle, and the bilateral Babinski which proved involvement of the pyramidal tracts. These symptoms were such as are not infrequently encountered in acute epidemic encephalitis. The increased cellular content of the cerebrospinal fluid added to the certainty of this diagnosis. At the same time, as frequently happened in instances of acute epidemic encephalitis, the diagnosis of tuberculous meningitis had to be considered. The history of coryza, and especially the presence of signs of bronchopneumonia made the former diagnosis more probable A careful investigation into the previous history of the patient revealed the fact that for months before the acute onset she was not well, and suffered from headaches and blurred vision. This fact, coupled with the absence of tubercle bacilli in the spinal fluid, indicated that she was most likely suffering from a mild form of epidemic encephalitis, upon which was engrafted an acute recrudescence, with fatal outcome. While the diagnosis made during life was fairly certain, a positive conclusion could not have been arrived at except by the histological study of the brain. The pathological findings support the diagnosis of subacute epidemic encephalitis.[2] An animal inoculated intracranially with an emulsion of the brain developed the disease and showed the characteristic lesions.

Case V.—E. R., aged ten; admitted April 12, 1921, died May 15th, 1921. Four weeks previous to admission the patient complained of headache and dizziness, and fell upon her forehead during an attack of vertigo; she was dazed but not unconscious. Local swelling appeared on the left side of the forehead. Diplopia followed the fall and persisted until admission to the hospital. From the time of the fall she was confined to bed because of instability and weakness of the legs. Periods of somnolence alternated with restlessness. There was occasional twitching of the legs.

Upon physical examination the child was noticed to lie upon her right side, slight turning producing violent vertigo. Right hemiparesis; hypotonia; ataxia; exaggeration of tendon reflexes; bilateral Babinski; deviation of tongue and jaw to the right; right facial weakness, apparently supranuclear; adiadochokinesis in right hand. Pupils reacted promptly to light and accommodation. Nystagmus was more marked to right, less to left and upward, least down. Right external rectus and right superior rectus weak.

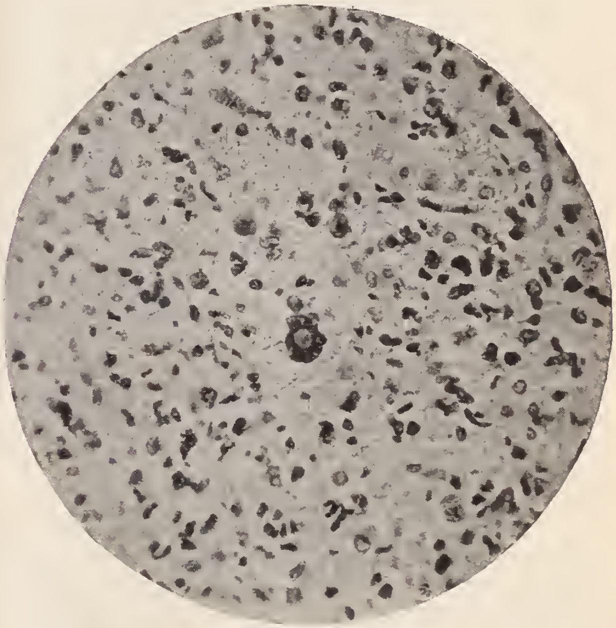

Fig. 11.—Case VI. Spongioblastoma. Section showing typical rosette formation.

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[2] We have recently studied three other cases which, because of a similar clinical course and characteristic anatomical changes belong, in our opinion, to a group which we consider as a subacute form of epidemic encephalitis. A complete study of these cases is now in preparation.

Bilateral corneal hyperesthesia. Abdominal reflexes absent. Left half of the tongue was crenated (atrophy). Difficulty in swallowing; diplopia; violent vertigo on sudden movement; occipital tenderness; no pain; no Kernig; no retraction of the neck. The hearing was normal; fundi also normal.

Blood counts: 12,000 white blood corpuscles; polymorphonuclears eighty per cent; no eosinophiles; blood pressure 105/80. The urine was negative. Blood and spinal fluid Wassermann were negative; globulin negative. The temperature remained approximately normal with occasional slight elevation. X ray examination showed nothing of importance, aside from a slight irregularity in sella turcica and slight thinning of cranial bones.

On April 16th the child complained of nausea and spasticity of the right arm and leg developed with marked thickening of speech; more pronounced facial paralysis was shown and spasmodic contractions of the right leg. On April 17th the head bent to the right, the gait was spastic, there was a tendency to fall to the left, and right adiadochokinesis. Spinal fluid was removed under normal pressure. Functional testing of vestibular apparatus indicated pressure on or involvement of the brain stem. On April 25th the child was a little duller; showed signs more and more like pontine encephalitis. On May 5th both optic discs showed decided blurring, especially on the nasal borders. Papillitis was diagnosticated. On May 6th the child was more stuporous, right hemiparesis increasing. Stupor increased on May 7th, and speech was hardly intelligible. The patient could not sit up. Nystagmus was more marked. There was a definite papilledema. On May 11th right hemiplegia was almost complete. There was a right cerebellar tilt of head. Dysphagia was present; the papilledema was increasing rapidly. On May 14th the left knee jerk was absent; there was no Kernig, but bilateral Babinski; abdominals were absent; Cheyne-Stokes respiration. Death occurred that day.

The diagnosis in this case varied during the patient's stay in the hospital. At first, she was regarded as a case of epidemic encephalitis; later on the possibility of a neoplasm in the pons or fourth ventricle was considered; and finally, with the appearance of the choked disc and the persistence throughout the course of symptoms pointing to cerebellar involvement, the diagnosis of tumor was entertained, and operation advised.

AUTOPSY FINDINGS.

Gross anatomy.—The dura was normal; the pia arachnoid was thickened at the base of the brain, particularly at the area covering a neoplasm. The cerebral hemispheres, aside from a moderate amount of flattening of the gyri (due to increased intracranial pressure) and shallowness of the sulci, showed no abnormality. At the base of the brain the normal topographical landmarks, such as the superficial origin of the cranial nerves, the cerebral vessels and the general outline of structures in the interpeduncular space, pons cerebellum, and medulla, were to a great extent obliterated by a diffusely spreading mass. The latter appeared to extend from the right middle cerebellar peduncle over the pons to the corresponding peduncle on the opposite side, then downward, covering the rest of the pons and the upper part of the medulla. This growth could also be traced cephalad, covering the right cerebral peduncle. On making several horizontal sections of the brain stem throughout the extent of the growth, it was found that the basal portion of the midbrain, pons, and upper part of the medulla were infiltrated to a depth of about one centimetre with the diffusely growing mass.

Concerning the cranial nerves, the first and second were normal, the third on the right side was flattened and ribbonlike. The same was true of the fourth, while the corresponding nerves on the left side were uninvolved. The fifth nerves were both caught in the mass, both sixth nerves were flattened, the seventh and eighth on the right side were soft and poorly defined. The ninth, tenth and eleventh nerves were apparently normal, while the twelfth were both covered in part by the tumor mass with only a few rootlets finding their way onto the free surface.

Microscopic anatomy.—Sections taken at various levels of the tumor mass presented a uniform appearance, characterized by a rich cellular structure, and an abundant vascular supply. The majority of cells were fusiform in outline, giving off long processes which appeared to anastomose with neighboring processes, and form a rather thick recticular net-work. Some of the cells appear to be bipolar, strongly suggestive of young glial elements. Throughout the field numerous rosettelike structures were seen, having the appearance of small acini. Giant cells were also frequently found irregularly distribed throughout the field. Ependymal cysts were also noted. The richly cellular content, the presence of numerous young glial cells, (spongioblasts) the presence of rosettes and ependymal cysts, lead us to the conclusion that the tumor is a gliosarcoma, but for which the term spongioblastoma is more appropriate. (Figs. 10 and 11.)

This case presented all the classical symptoms of a tumor beginning in, and involving, the right lateral lobe of the cerebellum. On admission to the hospital the only symptom lacking in the syndrome was a choked disc, which is a symptom of increased intracranial pressure, and not depending at all upon the part of the brain involved. The onset of symptoms was apparently acute, in that the child fell, and following the fall complained of diplopia. However, she had had attacks of dizziness and headache previous to the fall, but these symptoms had been disregarded by the child and the parents. The apparently acute onset, the absence of choked disc, and the rapid development of symptoms, together with an occasional slight elevation of temperature, brought up the question of encephalitis. The diagnosis of encephalitis was ruled out by the exclusive involvement of the cerebellum, the absence of cellular elements in the spinal fluid, and the absence of any symptoms of meningeal irritation. With the rapid development of a bilateral choked disc, the diagnosis of cerebellar neoplasm was again considered, and this diagnosis was substantiated by the autopsy.

One difficulty experienced in the diagnosis at the early stage of the disease was the appearance of a right hemiparesis, when all the symptoms pointed to the involvement of the right lateral lobe of the cerebellum and adjacent structures. Cases, however, of homolateral paresis with cerebellar lesions have been described, and the condition is probably due to indirect pressure upon the opposite pyramidal tract. The delayed appearance of papilledema was also responsible for the hesitancy to diagnose a tumor, although the absence of one symptom ought not outweigh the constancy of other cardinal symptoms. If this patient had not been admitted to the hospital during an epidemic of acute encephalitis, there would probably have been no difficulty in making the diagnosis.

Some Remarks on Penetrating Injuries of the Eye by Steel Particles*

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Penetrating injuries of the eye may be divided into two classes, namely, foreign bodies that penetrate the eye and come out again through natural causes, and foreign bodies that enter the eye and stay there. By penetrating wounds I do not mean small foreign bodies that penetrate the outer coats of the eye and may be picked out by a spud or knife or brushed away with cotton tightly wound upon a toothpick, I mean foreign bodies that actually penetrate all of the coats of the eye and enter the interior of the eyeball itself. Do not let it be assumed, however, that I seek to minimize the importance of small foreign bodies like cinders and fragments of emery that lodge in the coats of the eye, because I know full well the serious consequences resulting from such apparently trifling injuries. Such small foreign bodies should be carefully removed under strict aseptic precautions, because all who have had experience have seen cases where the improper and unclean removal, or attempts at removal, of such small foreign bodies has resulted in infection and the loss of an eyeball. Such unfortunate results are usually obtained by some shop workman who obtains an unmerited reputation for the removal of foreign bodies, and who does so with improper instruments and under unclean conditions, to say nothing of improper lighting facilities. Such results are also not infrequently obtained in the manipulation of shop doctors or inexperienced physicians who feel that the accident is so trifling that it is unnecessary to consult a specialist. I am referring in this paper, as I have said before, to foreign bodies that actually perforate the coats of the eye and enter the interior of the eye and are either pulled out, or drop out, or are worked out by the movements of the lid, or remain inside of the eyeball.

Foreign bodies coming under the first classification are usually long spindling pieces of steel that are sent with force through the air, perhaps by the forceful blows of a hammer on a chisel, and enter the eyeball either through the lid or directly into the eyeball itself. The lid, of course, is a great protection to the eye, and many an eye is saved from serious damage by the instantaneous closure of the lid upon the approach of danger, but sometimes the foreign body is driven with such force that it passes directly through the lid and into the eyeball itself. If the foreign body is of the long spindling variety it is usually picked out by the patient himself, or by some friend, leaving a hole through the lid and a perforation of the eyeball. Such lid perforations usually take care of themselves with proper treatment, although I have seen lids badly lacerated under conditions of this kind, requiring several sutures and careful manipulations to produce a normal condition of the lid later on; but it sometimes happens that the closure of the lid is not quite quick enough and the foreign body passes directly into the eyeball. It is then sometimes picked out by the injured man himself, or a friend, or a doctor, or is winked away by the action of the lid, leaving a more or less serious condition of the eye behind. Sometimes the eye is badly cut, either in the cornea or sclerotic, or directly through the sclerocorneal juncture. Sometimes the iris is more or less mutilated. Sometimes there is a prolapse of the iris, requiring a greater or less amputation of the iris in order to smooth off the wound and to prevent adhesions between the iris and the cornea or the iris and the lens. Sometimes the lens itself is perforated and a traumatic cataract produced. All of these conditions have to be cared for according to each individual case, but as a rule it is better to allow the eye to quiet down by rest in bed, quietude, soothing and antiseptic treatment, before resorting to further surgical procedures, unless the iris prolapses through the wound and needs to be gently withdrawn and cut off in order to prevent serious complications. Of course much depends upon the entrance of infection into the eye by means of the foreign body, and it is impossible at the start to look forward and tell what the results are going to be in cases of this kind; iritis may follow, or a detached retina, or a badly swollen lens, all necessitating considerable experience and judgment to handle it properly. Later on, as conditions indicate, a larger iridectomy may be necessary, or the removal of the swollen cataractous lens, and of course it is always possible that a removal of the eyeball itself will be the ultimate result.

The removal of the cataractous lens is by no means such a simple matter as some may think, because it has been my experience that such lenses are not by any means as semiliquid as some writers would seem to indicate, many of these lenses are quite hard and substantial in their character, and are not readily removed by the small incision produced by even a large triangular knife or keratome. As a matter of fact, my experience has led me almost to abandon the keratome knife in such operations and to use a Graefe cataract knife in order to produce a larger incision, because it is always bad policy to try to get a cataract out of an incision that is too small, too much pressure upon the eyeball is thereby produced and vitreous is frequently lost. If, however, it is deemed advisable to use a keratome it should be a large one, and it will frequently be necessary to enlarge the incision by the use of delicate scissors. It must also be remembered that in such traumatic cases the posterior capsule and hyaline membrane are frequently ruptured, thus making it easy for large amounts of vitreous to escape during the operation. Personally, I believe it much safer in cases of this kind to use Fisher's retractors rather than a speculum, because the retractors lift the lids from the eyeballs and relieve the eye of the pressure so often induced by the arms of a speculum. I also advise very little pressure to be applied to the eyeball by spoons, etc., for fear of loss of vitreous. I evacuate all of the lens substance that I can easily, and then wash out all of the lens substance that I can with my anterior chamber irrigator, gently applied, and, if some particles of lens substance persists in remaining behind, I prefer to leave it rather than to be too energetic in my efforts for fear of encouraging a great loss of vitreous. Most of such lens substance will be absorbed, and we should never forget that in endeavoring to save an eye we should not destroy it by too meddlesome surgery.

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We now come to the consideration of foreign bodies that enter the interior of the eye and stay there, and these cases are of course ones where our greatest hope lies in the proper and judicious use of the electric magnet, in fact, in order not to draw out this paper to unreasonable lengths I would take the liberty of confining myself to the consideration of those foreign bodies that perforate the eye and remain inside of the eye, that are magnetic in their character, not forgetting that foreign bodies of various kinds may enter the eye and remain there, such as wood, glass, shot and nonmagnetic iron Foreign bodies may of course enter the eye through the cornea, through the sclerocorneal juncture, or through the sclerotic, and these facts constitute the important features of this subject. Foreign bodies may of course be of all sizes and shapes. I have seen particles of steel driven into the interior of the eye so small that they almost took a magnifying glass to see them, and I have seen them so large that it was a mystery how the eyeball could conceal them. I have seen them long and short, smooth and rough, and I have never seen any two just alike. Some objects merely pass through the corneal layers and drop into the anterior chamber, some are lodged in the iris, others in the lens, others in the vitreous chamber, some are tightly wedged into the sclera, and some pass clear through the entire eyeball and are lodged in the tissues of the socket back of the eyeball; so you see we have all of these things to take into consideration, and each case must be studied by itself. Of course, when a piece of steel is in the anterior chamber, or iris, or lens, it can be easily seen, but when objects take refuge back of the lens they are frequently not easily discernible even with the ophthalmoscope. If the object is in the anterior chamber an incision through the cornea large enough to permit of its easy escape through the wound on to the magnet may be all that is necessary, especially if no infection or iritis follows. The same may be said if the foreign body is lodged in the iris, although under these circumstances, in drawing out the steel with the magnet, some iritic tissue will very likely come with it. I once saw a piece of steel so firmly embedded in the iris that the magnet not only drew out the steel but the entire iris at the same time. This is a danger that must not be overlooked, and too much magnetic force should not be applied under conditions of this kind.

If a little of the iris escapes it may perhaps be coaxed back into place again, but if it proves obstinate it may be cut off, thus making an iridectomy. A well dilated pupil will sometimes disclose the foreign body in the anterior capsule or in the lens itself. Steel in this location can usually be withdrawn with the magnet, but not always, and some authorities advocate that, inasmuch as the lens is practically unsupplied with nerve tissue, if a foreign body is located in the lens it can be let alone, but with this view I do not agree, because I believe that intraocular foreign bodies should be removed wherever they are if possible, and if it is necessary to remove the lens as well as the foreign body I should certainly advocate this procedure rather than to allow a piece of steel to remain in the lens in the hope that no trouble would follow. One cardinal rule I have found of great value, and that is to make my incisions amply large enough to allow of the easy exit of the steel. This more than anything else I believe avoids unnecessary traumatism.

Of course one of the first things we have to do in dealing with intraocular steel particles is to have recourse to clear and intelligible x ray pictures. Whenever I am in any doubt whatsoever as to whether there is a foreign body in the eye I have x ray pictures taken in order to clear up the situation. I find that patients are not trustworthy witnesses under these conditions. Most men who have received injuries assert that there is nothing inside of the eye, but I pay no attention whatsoever to opinions of this kind. I must have good x ray pictures. Not all x ray pictures are reliable. I have been deceived both ways, I have been told that there was nothing in the eye when there was and that there was something in the eye when there was not, but as a rule dependence can be placed upon clear x ray pictures, but they must be clear and good, and taken by a man who understands his business. I always insist upon two clear pictures, one a profile picture and the other a front view picture. If these pictures are good they will, in my opinion, be a sufficient guide as to the locality of the foreign body without going through all of the trouble of what is known as localization. Of course I have no objection to localization, and sometimes it is useful, but I believe in a vast majority of cases that a good profile picture and a good front view picture will disclose the location of the foreign body sufficiently for all operating purposes. It is not necessary, although perhaps desirable, to get a strong magnet directly over the site of the steel. The interior of the eyeball is not a vast place after all and, in my opinion, if a magnet is going to draw a piece of steel from the interior of the eye, it will do so any way if placed somewhere near the location of the foreign body.

In operative work I divide my operative procedures into two parts, namely, foreign bodies located in or anterior to the lens, and foreign bodies located posterior to the lens. In foreign bodies located in or anterior to the lens I believe it to be advisable to remove the foreign body by what may be called the anterior route, that is, through the cornea, but where foreign bodies are located posterior to the lens I believe it is better to make an opening through the sclera and remove the foreign body through the posterior route. This is a dictum which I enunciated many years ago. This view was at first scorned by most ophthalmologists, who believed in following the rules of Haab, to remove all foreign bodies through the cornea, but I believe now that the rule of removing foreign bodies that are posterior to the lens through the sclerotic is quite generally endorsed. I will make a single exception to this rule, and that is, if I have a patient who comes to me within a few hours after he has been injured and the steel has entered through the cornea and perforated the lens, thus producing a cataract, and is lodged in the vitreous chamber with as yet an unhealed wound, I give this man an opportunity of removing the steel through the avenue of ingress; but if he comes to me after the wound has healed, I then remove the steel through the posterior route. Of course if we remove steel through the anterior route we should do whatever seems necessary under the circumstances. If there is a prolapse of iris it should be cut off; if there is a cataract as much of it should be removed as can be removed in safety.

Some reasons for removing steel, located posterior to the lens, through the posterior route are as follows: In the first place it must be remembered that there are very few genuine Haab magnets in this country. A genuine Haab magnet is a double ended affair, setting upon a standard, and extremely powerful. The magnet is never removed from the standard, the patient sits in front of the magnet and the head is moved in various directions in place of the magnet being moved in various directions. Inasmuch as there are so few of these magnets in this country there is very little use in giving instructions as to what to do with a Haab magnet. There are various magnets put upon the market by electric concerns which are erroneously called Haab magnets, but they are not really Haab magnets. The genuine Haab magnet is capable of drawing small particles of steel from the extreme posterior portion of the eyeball into the anterior chamber, but the magnets that we American ophthalmologists use are frequently not capable of so much drawing power.

It is almost amusing to read the descriptions of how a piece of steel can be drawn by the magnet along the floor of the vitreous chamber and then coaxed carefully along the surface of the ciliary body and through the ligament of the lens into the space back of the iris and then raised up as high as the pupil and drawn through the pupil and dropped into the anterior chamber of the eye, and then taken out by an incision in the cornea without injuring the lens, or anything else for that matter. I do not question but what this can be done, in fact I have done it myself, and I have seen Professor Haab do it in Zurich, Switzerland, but it is quite evident that this can only be done with very small pieces of steel, and with pieces that have no particularly sharp corners to catch, pull and tear the delicate structure of the eyeball as they come along. Steel objects of any particular size will have to be drawn directly through the lens itself, thus producing a cataract, if a cataract has not already been produced by the accident itself. I am, therefore, firmly of the opinion that objects located in the vitreous chamber of the eye had better be removed by an opening through the sclerotic coat of the eye and am confident that much less damage is produced than if we endeavor to pull a ragged, jagged piece of steel of average size through the delicate anatomical structure in the anterior portion of the eyeball.

I am aware of the fact that an operation such as I advocate is liable to produce hemorrhage in the vitreous chamber, detached retina, atrophy of the choroid, etc., but I still contend, all things considered, that this is the safer route of exit of objects located in the vitreous chamber. In performing this operation I make my incision in the quadrant of the eye nearest to the foreign body, as indicated by the x ray pictures. In other words, my incision is made either between the external and inferior rectus muscle, or the inferior and internal rectus muscle, or between the internal and superior rectus muscle, or between the superior and external rectus muscle. I pick up a piece of the conjunctiva with forceps near the sclerocorneal juncture and make an incision with a pair of scissors. I make a triangular flap of the conjunctiva and lay it back, thus disclosing the sclerotic coat of the eye. I then take a Graefe cataract knife and plunge it through the sclera and make an incision parallel with the fibres of the sclera from before backwards, avoiding, of course, the ciliary processes. The size of the incision, of course, is graduated according to the size of the object, as indicated by the x ray picture. I then place the strongest end of the magnet at the opening and turn on the current. If the object does not present readily I turn the current on and off several times so as to jerk the object loose. I direct, or aim, my magnet in the direction of the foreign body as near as I can, as I believe in this way the object is more likely to come out end to end, instead of broadside. It is much easier to pull an object out if it presents end to end, than if it presents broadside. I try not to be impatient if the object does not come at once but keep on using the magnet, being sure, by testing it from time to time, that it is working. If the operation proves tedious I pass the magnet as far back into the orbital cul-de-sac as possible and milk it forward, trying to coax the object along toward the incision. I never introduce a magnetic end into the eye itself until all other methods have failed, because I believe that eyes are not infrequently destroyed by the intraocular manipulation of magnetic ends. It sometimes happens, of course, that the object is firmly wedged into the sclerotic coat of the eye and will not come loose, in which case I leave it. It may also happen that a steel particle passes entirely through the eye and is lodged in the fatty tissues of the orbit, in which case it is best to leave it alone if we are convinced of its location by the x ray pictures. I sometimes have been able to remove foreign bodies through the sclerotic opening by holding the two lips of the sclerotic wound apart by two little demagnetized hooks that I suggested years ago. Every effort should, of course, be made to avoid losing vitreous. If I am compelled to introduce a magnet point inside of the eye, I never do it more than twice, as I would rather leave the foreign body than destroy an eye by meddlesome surgery.

After the operation is finished I never suture the sclera, as this membrane is so tough that considerable vitreous is liable to be lost in suturing it, and beside that we leave inside of the eye by means of the suture a particle of silk thread that is likely to produce infection. I simply pull the conjunctival flap over the opening and close it with two sutures, one on each side. I never endeavor to suture the apex of the flap, on account of the scarcity of conjunctival tissue that will always be found near the sclerocorneal juncture and the danger at this point. I have removed hundreds of particles of steel in this way and have never regretted not having sutured the sclera.

It must never be forgotten that the end results in cases of this kind are not always good, no matter how smooth the operation may be nor how soon after the invasion of the foreign body the operation is performed. Intraocular changes, panophthalmitis, cataract, iritis, sympathetic ophthalmia, etc., may follow, and ruin what appears to be a favorable operation. Nevertheless, I believe that by following the suggestions offered in this paper the best results will be obtained in the removal of steel particles from the interior of the eyeball.

I have for many years used the hand magnet, invented by Dr. Sweet, of Philadelphia. While it is a hand magnet and can be conveniently manipulated with accuracy and delicacy it is nevertheless very powerful, and I have very seldom been disappointed in its use.

7 WEST MADISON STREET.

Protein Sensitization as a Possible Cause of Epilepsy and Cancer

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The effect of introducing foreign protein into the human body has for a number of years been a subject of ever increasing interest. The employment of diphtheria antitoxin, which first came into general use toward the close of the nineteenth century, first afforded an opportunity for the observation of these effects, and since then there have been many contributions to the literature on this subject, and a constantly widening application of the knowledge gained by experimentation and clinical observation along these lines.

Idiosyncrasies to food, drugs or proteins in the form of dust and pollen have been recognized for a long period, but until recently the whole subject was looked upon as one of the interesting anomalies of medical practice, and no effort was made to explain it upon a scientific basis. During the past ten years, however, great advances have been made in the study of protein sensitization, the meaning of anaphylactic reaction, and the possibilities of clinical utilization of the knowledge gained through animal experiment, and the reactions—many of them unfortunately serious and even fatal—which have been observed in human beings, have become more and more apparent to the medical profession at large. At present one can hardly take up a medical publication—no matter what specialty it aims to cover—without finding something in it relating more or less directly to the subject of anaphylaxis or protein sensitization.

The discovery that numerous affections, the etiology of which had hitherto been shrouded in mystery, owed their origin not to a specific infection but to a sensitization which could be accurately ascertained and very possibly obliterated, gave a tremendous impetus to observation and investigation of these conditions, and it now seems possible to hope that the number of socalled diseases owing their origin to similar causes may be indefinitely extended, and the hope of amelioration and cure infinitely increased.

The suggestion of obscure etiology naturally brings to mind two conditions responsible for an incalculable amount of human suffering and misery, the cause of which has hitherto lain hidden from the most persistent and inquiring students of disease, namely, epilepsy and cancer. Their possible dependence upon protein sensitization has already been suggested by many factors long recognized as contributing to the prevalence and virulence of these affections, and the recent extended consideration of the part played by basal metabolism in the various conditions produced by endocrine imbalance, has brought out many facts having a peculiar interest in this connection. It is now generally accepted that the underlying cause of bronchial asthma is disturbed metabolism; this same etiology is attributed by many observers to hay fever. Might not the same prove true in regard to epilepsy and cancer?

The disturbances which we know as hay fever and asthma are supposed to be brought about by the action of the split proteins demonstrated by Vaughan, the presence of which is due to imperfect assimilation in the digestive tract. These poisons seek exit through the mucosa of the nasal and bronchial passages, there producing a condition which remains latent until the individual in question inhales some exciting agent—such as a plant pollen or animal emanation—whereupon a typical attack is manifested, the severity of the infection depending upon the hypersensitiveness of the individual to the particular local exciting agent. Reasoning by analogy it would appear by no means unlikely that a similar etiology might be attributed to epilepsy and cancer. It seems possible that epileptic seizures might be the result of exciting agents acting upon the brain through the intermediacy of the nasal sinuses, and in both epilepsy and cancer protein poisoning through ingested food may well be the sole causative factor.

Writing of the treatment of epilepsy I. S. Wechssler (1) recently said: "From the treatment of many cases I have gained the impression, which almost amounts to a conviction, although I cannot prove it, that certain foodstuffs bear a special relation to some of the epilepsies. It has, of course, been known all along that various foods apparently have a deleterious influence in epilepsy, but it seems to me that there is something akin to a sensitization, to a reaction (anaphylactic?) of the organism to certain proteins or possibly endotoxins which result in convulsive phenomena. The periodicity of some of the epilepsies may point in that direction. In a few instances I have been told by patients that certain diets are likely to bring on attacks. One patient definitely attributed his improvement to the fact that he had given up eating eggs, and on one occasion when he did eat them (he used to be very fond of them and ate many at a time) he paid for his heedlessness with a convulsion."

Dr. Wechsler's experience has been very extensive. The basis of the study from which this quotation is made was only fifty-eight patients, but the author's opinions have been formed by observation of epileptics in great numbers, many of his cases being of very long standing. His opinions, therefore, should carry considerable weight.

Dr. J. Finley Bell has kindly permitted me to report two cases from his practice which are interesting in connection with the possibility of a protein sensitization as the exciting cause of epilepsy.

Case I.—The first case is that of a girl, now fifteen years of age. She was breast fed for three weeks after birth, after which the failure of the breast milk compelled a resort to artificial feeding. It was noted that she vomited practically all food of which cow's milk was a constituent, steadily lost in weight, and very shortly rickets developed. Later she became subject to brief periods of stupor when it was impossible to rouse her, and she also acquired a habit of momentarily drooping the head which was for a time supposed to be merely a "cute baby trick," or, if it occurred at the table, an endeavor to mimic her father as he said grace. During the first year of life she had a typical convulsion which was attributed to teething, and this was followed by a half dozen similar seizures, all supposed to be due to the eruption of teeth or to digestive disturbance.

When the patient reached school age she proved an excellent student, but was subject to violent outbreaks of temper, which came on without apparent cause and quickly subsided, the patient afterwards apparently not realizing that anything unusual had occurred. Between the ages of eight and twelve years she had several major epileptiform seizures, with biting of the tongue and involuntary passage of urine and feces. Thereafter, she was regularly subject to major attacks and the outbursts of temper became so violent that the mother described them as frenzy. Constipation became habitual, and immediately preceding the seizures there was marked flatulence.

The patient was placed upon a meat free diet, consisting largely of milk and vegetables; cheese, which was at first included, had to be given up because of its bad effect upon digestion. Under this regimen the epileptiform seizures ceased, but the so-called frenzy outbreaks were unaffected. During one year there was apparently but one nocturnal attack, but toward the end of this period the patient rebelled against the restricted menu, and her craving for meat was given limited indulgence. Within a short time the major attacks had returned with their former violence and frequency.

A careful x ray examination of both head and abdomen failed to disclose conditions which were of aid in diagnosis, but protein sensitization tests gave reactions to cow's milk, cheese, casein, beef and veal. The food restrictions were now revised, so as rigorously to exclude all bovine products, but otherwise the diet was to be as general as possible. Since she has been confined to this diet the patient has had but one seizure of any sort. This occurred in school, when she vomited and fainted, but it was apparently not an epileptiform seizure and may have been due to the accidental ingestion of some sensitizing protein.

Case II.—In Dr. Bell's second case no very marked protein sensitization could be demonstrated. The patient gave an inconstant and feeble reaction to cheese, but clinical observation showed that she was subject to epileptic seizures after eating cheese or butter. When all cow's milk products were eliminated from her diet she ceased to suffer from the epileptic attacks, and more than a year has now elapsed without a return of the seizures. During the past three months she has been taking parathyroid extract.

John Thomson (2), of Edinburgh, reporting two hundred cases of convulsions in infants, lays special stress upon the relation between possible poisoning from the proteins of cow's milk, egg white, oatmeal or other common foods and the idiopathic convulsions of early infancy, and thinks "there can be little doubt that the interesting and as yet only partially understood process of anaphylaxis plays an essential part in the causation of some, and perhaps many, morbid phenomena." Continuance of the offending diet may lead to asthma, eczema and possible epilepsy in later life.

The relation between food poisoning and the development of epilepsy would seem to be fairly well substantiated by such examples, any number of which could be brought forward if necessary. It seems reasonable to suppose, however, that these poisons may enter the system and penetrate to those areas of the brain where their action is able to produce epileptiform seizures, in other ways than that of being taken into the stomach in the form of food. If the foreign proteins are capable of producing the annoying and distressing manifestations of asthma and hay fever by coming in contact with the bronchial tubes, the mucosa or the skin, could they not cause the symptoms of epilepsy if they were able to reach the exquisitely sensitive nerve centres by passing through the accessory sinuses of the nose? Certainly research along these lines could hardly fail to bring forward some interesting data which might be of inestimable value in clearing away the obscurities with which the etiology of epilepsy is now surrounded.

If an effort was made in every case of infantile convulsions to find the offending protein which was responsible for the seizures I feel sure that many future cases of epilepsy would be aborted. When the protein poisons enter the circulation they seek those areas least able to resist their action, which in these cases are the nerve centres, the irritation of which causes tonic and clonic spasms of the extensor and flexor muscles. If the situation is comprehended early enough, before the continued action of the foreign protein has rendered the affected nerve centres intensively sensitive, and prompt remedial measures instituted, it cannot fail greatly to reduce the future incidence of epilepsy.

L. Duncan Bulkley (3) has long been known as the champion of the constitutional, in contradistinction to the local, nature of all forms of carcinoma, and has defended the position of those who assert that therapeutics can effect far more than surgery in the treatment and elimination of this disease. It has been demonstrated that cancer results from a disturbed activity on the part of heretofore normal cells, and the exclusion of all other possible causes naturally leads us to look to a disordered metabolism as the cause of this disturbed action. Repeated laboratory experiments have shown in a most remarkable manner the absolute controlling effect of diet on the development of inoculated cancer in rats and mice, as with certain vegetable feedings the process was almost entirely inhibited. We thus see that as the laboratory has eliminated the local nature of cancer, it has also, in a measure, established the fact that there are medical aspects of the disease which further studies will show to be of the utmost importance. All these tend to emphasize its constitutional origin and its relation to disordered metabolism, which is now so widely recognized as a causal factor in a vast number of morbid states.

We have it on the authority of Dr. Bulkley that the late John B. Murphy, of Chicago, was pessimistic regarding the ultimate results of the surgical treatment of carcinoma, especially in those patients who were fat and had lax tissues, that is, those who exhibited evidence of imperfect metabolism. He also quotes William J. Mayo as calling attention to the infrequency of cancer among savages and the lower animals as having a bearing upon the question of the possibility "that there is sometihng in the habits of civilized man, in the cooking, or other preparation of his food, which acts to produce the precancerous condition. . . . If flesh foods are not fully broken up, decomposition results and active poisons are thrown into an organism not intended for their reception, and which has not had time to adapt itself to the new function. . . . The prophylaxis of cancer depends, first, on a change in cancer producing habits, and second, on the early removal of all precancerous lesions and sources of chronic irritation."

These views emanating from men who have given years of intensive study to the cancer problem, ought to impress the medical profession at large with the importance of searching for clinical evidence which might aid in establishing the cause of this tremendous menace to the life and efficiency of civilized man. Small evidences, if accumulated in sufficiently large numbers, may in the end be the means of elucidating this seemingly insoluble problem. For instance, there have been some cases of cancer of the tongue which the reporters believed due to the irritation caused by licking postage stamps, as local irritation has long been regarded as a prominent causative factor in all forms of buccal cancer. But does not the fact that the paste used upon envelopes and postage stamps is composed of wheat products and such animal substances as skin and bones, offer another possible explanation of the relation between the contact of the tongue and the adhesive substance, that we are dealing with a protein sensitization, and not a purely local lesion?

When the offending cause is eliminated from the system of the asthma patient the bronchial tubes return to their normal state; the same is true in hay fever and eczema. In epilepsy the patient will suffer an attack of his malady after the ingestion of foreign protein, will recover from the attack, and after a short period of recuperation continue in good health until there is again a sufficient accumulation of protein poisoning in his organism to precipitate another seizure, depending upon the sensitiveness of his nerve centres and the amount of foreign protein gaining entrance to his circulation. When we have to deal with cancer the parts diseased are of a more delicate nature, and if once destroyed regeneration is impossible. But if we can recognize the cause and extirpate it, further destruction will be prevented, and if our efforts have been made early enough a fair prognosis is still possible.

The recently published studies of Longcope (4) on protein hypersensitiveness would seem to bear out the possibility of an anaphylactic origin for both epilepsy and cancer. He tells us that "to explain satisfactorily the clinical manifestations of the idiosyncrasies and allied disturbances, one must consider two factors: first, the possibility of a specific hypersensitiveness toward some protein or some chemical substance, and secondly, the possibility of a direct intoxication by some poisonous derivative of the protein molecule. How nearly related these are and what part the second plays in causing symptoms in the hypersensitive individual, it is impossible to state at the present time."

The whole subject of protein sensitization is as yet in its infancy, despite the immense amount of work which has been done upon it. Its possibilities appear almost infinite, and it surely offers a bright ray of hope illuminating the obscurity in which those who sought to control and conquer these two great human scourges, cancer and epilepsy, have for so long a time been impotently groping.

REFERENCES.

1. WECHSLER, I. S.: The Treatment of Epilepsy: Based on Records of Fifty-eight Cases. *Medical Record,* 100, 714, October 22, 1921.

2. THOMSON, JOHN: Clinical Types of Convulsive Seizures in Very Young Babies. *British Medical Journal,* 2, 679, October 29, 1921.

3. BULKLEY, L. D.: *Cancer and Its Nonsurgical Treatment.* F. A. Davis Company, 1919.

4. LONGCOPE, W. T.: Protein Hypersensitiveness and Its Importance in the Etiology of Disease. *Journal A. M. A.,* 77, 1535, November 12, 1921.

411 NINTH STREET.

Summary of a Year's Work (1920) in Urology

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The Urological Service at the Brooklyn Hospital holds the same relative position to the other services as is occupied by the various other surgical specialties. While the attending urologist is responsible for all urological cases admitted to the hospital, he is in turn responsible to the attending surgeon in charge of one of the general surgical divisions, and through him to the executive branch of the hospital, for the proper conduct of his service. This arrangement has proved eminently satisfactory and has promoted a cordial coordination of effort. Weekly conferences are held at which the attending surgeon presides and which are attended by all members of the service, both general and special surgery, including the clinical assistants in the outpatient department. At this time interesting cases and obscure diagnostic problems are discussed, errors of omission or commission are fully commented upon, x ray plates, operation and autopsy specimens are studied, deaths and infections are particularly summarized in an effort to determine a possible preventable cause. These meetings have accomplished much in the way of bettering the service, stimulating the interest of the younger men, and standardizing the work of the various departments.

For convenience in summarizing and discussing our work, the urological service may be said to consist of three distinct parts, all however closely related; all under the direction of one chief; and manned by a staff of assistants who rotate in the various departments and their subdivisions; so that at all times every man has some definite relation toward the whole service.

These three parts are:

1. The hospital work proper: urological operations and the care and treatment of patients requiring bed and indoor attention.

2. A well equipped cystoscopy room immediately adjoining the x ray room. Here all hospital patients requiring any form of cystoscopic manipulation for diagnosis or treatment are cared for. In addition to this group, outpatients in whom the diagnosis is obscure and who are likely to require the more advanced forms of cystoscopic examination such as pyelography, waxtipped catheterization, and other similar procedures, are examined in this room, as are patients upon whom fulguration and the other forms of intravesical operative procedures are indicated. This clinic is operated two mornings each week by the chief and two or more of the senior associates.

3. The dispensary or outpatient department where the patients suffering from the venereal diseases (including syphilis) are cared for, and the younger men are trained in endoscopy and cystoscopy in addition to their other routine work, rotating through the various procedures of treatment at monthly intervals. Of course most of our nonvenereal urology comes first to this department. The various problems presented may be worked out there, or the patient may be referred to the special cystoscopic clinic mentioned above.

Under the first heading there were 485 admissions. These cases we propose to group and discuss according to the location of the lesions. While the number of cases is relatively small, yet they serve to demonstrate the methods employed and furnish a basis for conclusions when considered in relation to similar groups of cases studied in preceding years.

SURGICAL LESIONS OF THE KIDNEYS.

There were thirty-five admissions divided as follows: Tuberculous kidney, three; renal calculi, eight; pyonephrosis, three; papillary carcinoma, one; adenocarcinoma, two; hydronephrosis, one; nephroptosis, four; unilateral nephritis, two; pyelonephritis, three; bilateral pyelitis, two; unilateral pyelitis, six.

The tuberculous kidneys were treated by lumbar nephrectomy. Two of the lesions were in adult females, and one in a boy of eight. This is the youngest patient we have had in our clinic. The symptom which drew attention to his condition was bedwetting. Pyuria was demonstrated by the family physician and the case was referred to us for diagnosis. The ureters were catheterized, illustrating that youth is no contraindication to this procedure, and the diagnosis of left renal tuberculosis established. Of the other two cases, one was on the right side, the other on the left. The three patients made good operative recoveries; the boy is much improved, although he still occasionally wets the bed; one woman is entirely relieved of all symptoms; the other patient is yet, four months after operation, under observation and treatment for an irritable bladder incident to extensive ulceration and contraction. That, of course, is a common story. I believe that most of these conditions finally heal, although many never return to a normal interval of urination, because of the gross damage to the bladder wall caused by the ulcerations. While these ulcers may, and usually do heal, there is left a scarred and contracted bladder. These patients are advised to follow the usual hygienic treatment indicated for tuberculosis in any part of the body. We have tried many forms of local treatment for the bladder and have not been impressed with the results obtained from any of them. It is our custom at operation to remove as much of the ureter as appears grossly diseased, using a separate groin incision if necessary. The ureter stump is cauterized with phenol, touched with alcohol, and tied with chromic catgut. The wound is closed in layers with a small cigarette drain at the dependent angle. In this series all the cases healed *per primam* and remained closed.

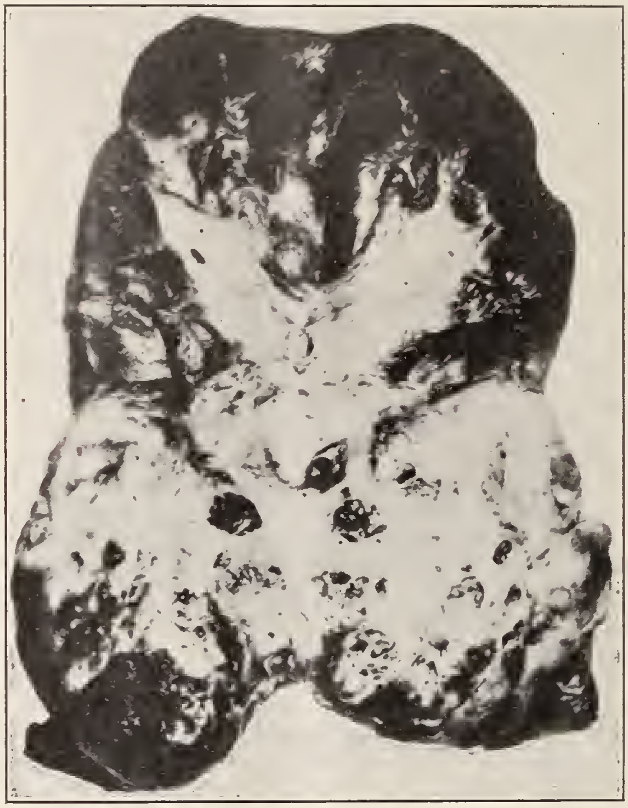

Fig. 1.—Adenocarcinoma of kidney. Specimen removed from patient.

Of the renal calculi, one patient refused operation, in one, operation was advised against because of other complicating factors. The remaining six were removed by operation; four by means of pyelotomy, and one, a huge calculus by nephrectomy. This last patient applied for treatment because of two attacks of painless hematuria in the past year. There were no other symptoms. He had a rather stormy convalescence from his operation and suffered from a moderate degree of cardiorenal decompensation. He eventually left the hospital in fair condition and is now, nine months after operation, in fair health and following his regular occupation, although he has an occasional cast in his urine. The four cases treated by pyelotomy made uneventful recoveries and are entirely relieved of their symptoms.

Pyelotomy is undoubtedly the operation of choice, even for small calculi in the calyces. It is our custom to suture loosely the wound in the kidney pelvis and reinforce this with a loose suture in the peripelvic fat. We have never had any troublesome fistulæ. Nephrolithotomy we consider a dangerous operation rarely indicated. The other case was a small calculus which had been accurately located by means of pyelography a few weeks previous in the tip of the lower calyx. At operation no calculus was found. A radiograph taken a few days later showed it at the lower end of the ureter, and it was removed by cystoscopic manipulation. Since this experience we have established a routine of making a radiograph a few hours before operation, and believe this should always be done.

Of the three cases of pyonephrosis, two patients were nephrectomized and one subjected to a nephrotomy. The last was a man who complained of left lumbar pain and vesical irritability, which had been present for about a year. There was no history of antecedent infection except a bad pyorrhea which was present at the time of admission. Examination disclosed a somewhat enlarged tender kidney with a moderate amount of pus in the urine and colon bacillus on culture. At operation a small abscess was found in the cortex at the lower pole. Cultures from this were sterile. The abscess was incised and drained, and the patient made a prompt recovery with complete relief of symptoms. One case followed and complicated a prolonged puerperal sepsis, and was of particular interest because at operation the vena cava was torn. A clamp was applied to the lateral wall, and removed at the end of forty-eight hours with the patient under general anesthesia, and the wound widely opened in preparation for trouble. The clamp was slowly and carefully removed; there was no bleeding; the wound was reclosed with a light gauze drain, and the patient made a good recovery. In the third case the primary cause of the trouble was not elicited. A nephrectomy was followed by an uncomplicated recovery.

There was one case of papillary carcinoma of the kidney, which also involved the ureter. This was an advanced case, perhaps too advanced to be operable. There was a huge mass filling the left loin and hypochondrium. However, we decided upon an abdominal nephrectomy, which was performed. The operation was extremely difficult; the patient was profoundly shocked; and while the kidney was removed we were obliged to abandon the operation without removing all the ureter as we had planned to do. After recovery from his primary shock the patient made an uneventful operative recovery. One month later we operated again, hoping to remove the remainder of the ureter which we knew was involved. At this time the ureter was so bound down to the great vessels that it was obviously inoperable. The patient returned to his home and died four months later. The importance of removing the ureter as well as the kidney in these cases should be emphasized.

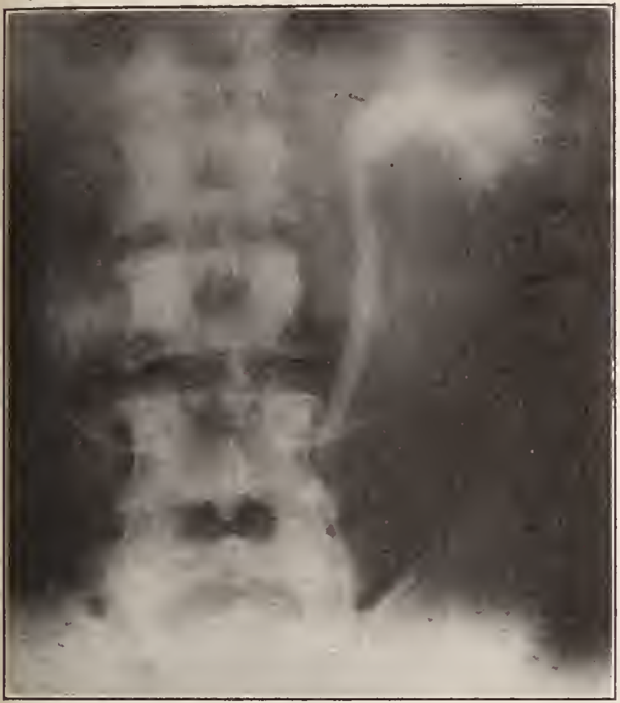

Fig. 2.—Stricture of ureter, dilated ureter and renal pelvis.

The two adenocarcinoma cases the patients were subjected to nephrectomy by the abdominal route. One made a good operative recovery and left the hospital in three weeks. One month later there developed a polyarthritis with endocardial involvement from which the patient died. No autopsy was obtained and it is impossible to say what, if any, relation the terminal condition bore to his renal tumor. The other patient made a good recovery and the patient is well to date, four months after operation—too early of course to have any bearing on the prognosis. In this case we were materially helped in our diagnosis as we have been in numerous instances, by pyelography. Because the neoplasm encroaches on the pelvis and calyces, it is shown as a filling defect in the pyelogram. This factor is considered of much greater diagnostic value than the socalled spiderweb arrangement which is often noted in the more advanced cases in which the diagnosis is obvious. A pyelogram of the kidney showed that the upper calyx was normal, the middle somewhat irregular, while the power calyx was entirely absent, its place being taken by the tumor of the lower pole, which was faintly outlined. Figure 1 shows the specimen removed.

There was only one case of hydronephrosis in our hospital admissions for the year. This occurred in a woman who applied for treatment because of profuse hematuria. She knew that for many years she had had a movable right kidney. The hemorrhage was traced to this organ which was practically void of function and showed a rather striking pyelogram. Nephrectomy was clearly indicated but was declined and the patient has passed from under our observation.

There were two operated cases of socalled unilateral nephritis. One was an adult male who for several years had complained of a dull aching pain in the right loin, which occasionally radiated along the ureter. The objective findings except for tenderness over the kidney were negative. The kidney was explored and nephrotomized. No gross changes were noted. This was an unsatisfactory diagnosis and it would perhaps be difficult to defend the operative procedure. Yet the patient was apparently relieved of his symptoms. This is one of a group of cases that is not well understood. The other case occurred in a woman of fifty who, in addition to lumbar pain, had had in the past year several copious hemorrhages from the affected kidney. At operation the cortex and cut surface showed numerous very small cysts. The kidney was removed. The rather long pathological report spelled chronic interstitial nephritis. The patient is well one year after operation with no indication of trouble in the remaining kidney.

There were four cases of nephroptosis upon three of which we performed nephropexy with entirely satisfactory results in all. This operation has, of course, been much abused and performed many times for no good indication. We wonder, however, if the pendulum has not swung too far. No com-

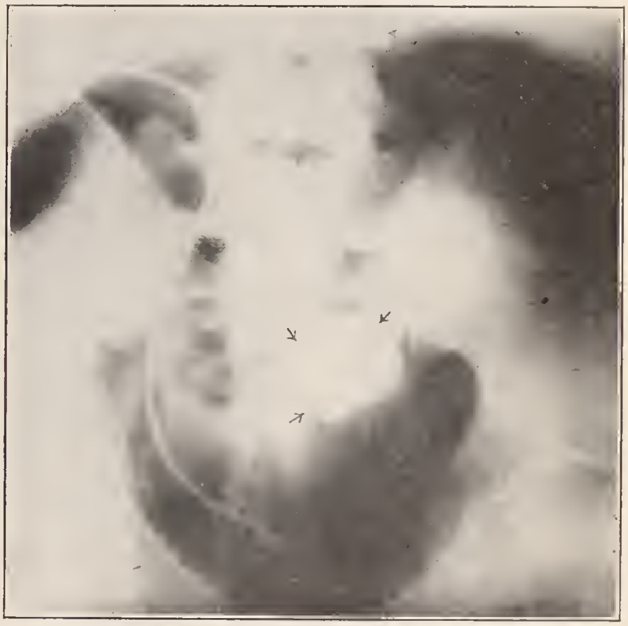

Fig. 3.—Calculus in lower end of ureter; complicated by pyonephrosis requiring nephroureterectomy.

petent surgeon would operate upon a movable kidney which was giving no symptoms and which was discovered accidently in the course of a routine examination, nor would he operate for a prolapsed kidney which was simply a part of a general ptosis of all the abdominal viscera. However, there are not a few cases in which the prolapsed and movable kidney complicated by kinking of the ureter and beginning hydronephrosis can and, in our opinion, should be relieved by a well performed nephropexy.

There were three cases of pyelonephritis, one of the hyperacute type complicating an obstruction with calculus and accompanied by a profound general sepsis, demanding a prompt nephrectomy as a lifesaving procedure. One was of the subacute type and followed an attack of influenza. This case responded to conservative measures; vaccines, fluids, urinary antiseptics, and other forms of treatment. The other patient was admitted because of a mild hematuresis which was traced to the left kidney, from which we also obtained pus and pus casts with colon bacilli. This patient is still under observation and the pyuria persists.

There were six admissions for pyelitis; two bilateral and four unilateral. All showed colon bacilli in the urine. Some of the patients were admitted with a provisional diagnosis of calculus which was not demonstrated. It is our custom to treat these cases with pelvic instillations of mercurochrome-220. Our results have been moderately encouraging; in fact, many of these patients are markedly benefitted by simply passing a ureteral catheter, suggesting stricture as the underlying cause.

DISEASES OF THE URETER.

There were twenty cases as follows: Stricture, six: calculus, twelve; papillary carcinoma, one; ureterocele, one.

The six cases of stricture of the ureter were all relieved of their symptoms by dilatation through the cystoscope, and they all continued treatment as ambulatory patients after leaving the hospital, and have remained to date free from trouble. It seems to us that Hunner has made his point, and that stricture of the ureter is established as a clinical entity. Figure 2 is simply an illustration taken from a considerable number of cases, in most of which the patients were seen and treated in the office and dispensary.

Twelve patients with ureteral calculi were admitted to the hospital. Four of these were delivered by cystoscopic manipulation of one sort or another. Two in the upper ureter were removed through an incision in the kidney pelvis. In two cases there were extensive changes in the kidneys requiring nephrectomy. Another case illustrated in Figure 3 had the largest ureteral calculus we have seen and required the removal of the kidney and the entire ureter. This patient was admitted three months preceding the operation with almost complete suppression of urine. In addition to the calculus in the lower portion of the left ureter, shown in the cut, he had also a fairly large calculus high up in the right ureter. This was removed by pyelotomy and he returned later for the nephroureterectomy on the left side. Four months after operation he was in good health, although there was still pus in his urine. One patient was admitted with multiple small calculi in the stump of a ureter left after a nephrectomy performed twenty-five years before for calculus pyonephrosis. This patient was a woman of fifty-three who had had trouble since her nephrectomy—frequent attacks of pain referred along the course of the ureter, accompanied by chills and fever. These attacks had become very frequent in the past year and lasted two or three days. They were relieved by the passage of very turbid urine. The condition was readily demonstrated by cystoscopy and ureterography. At operation about ten inches of much dilated ureter filled with mucopurulent débris and calculi was removed through an extraperitoneal incision. There was also present a large uterine fibroid which added materially to the difficulty of the operation. She made an excellent recovery although she still has some bladder symptoms which we believe are caused by pressure of the fibroid tumor.

Two patients passed from under our observation with their calculi still in the ureter. All the other patients in this group have remained well to date.

There was one papillary carcinoma of the ureter subjected to exploratory operation and found inoperable.

There was one ureterocele which presented at cystoscopy a soft cystic mass about the size of an English walnut. The ureteral opening was posterior to the tumor, near the bladder wall. Cystoscopic manipulations of all kinds failed to bring it into view, although the frequent collapse of the tumor and a whirl from behind it indicated its presence and its location. A suprapubic cystotomy and a plastic operation on the lower end of the ureter were performed. There was present a pyelitis, but the kidney showed an excellent phthalein output. The patient returned to the hospital three months after operation with an acute exacerbation of the pyelitis, which subsided with conservative measures. He has since passed from under our observation.

DISEASES OF THE BLADDER.

There were twenty-three admissions as follows: Papilloma, one; carcinoma, five; ulcer, two; cystitis, four; calculus, two; urethrotrigonitis, three; suprapubic fistula, three; diverticulum, two; foreign body, one.

Almost all of our papillomas are treated as ambulatory cases by means of fulguration. One patient was referred for open operation because he did not respond to fulguration. At operation a small soft tumor presenting all the earmarks of benign papilloma was excised with the cautery. The pathologist reported papilloma. However, six months later there was a recurrence, and at a second operation the condition was found frankly carcinomatous. It would appear that any bladder tumor which does not respond to fulguration is, to say the least, potentially malignant.

There were five admissions for bladder carcinoma. Of these four patients died in the hospital; one, three days after admission, no operation having been performed. One case was complicated by extravasation and urinary sepsis, following a cystotomy and radium treatment at another hospital.

A suprapubic cystotomy was performed and an effort made to drain the infected tissues, but the patient died in twenty-four hours from sepsis. One died from apoplexy ten days after a cystotomy and application of radium. Another died three weeks after the same procedure from exhaustion and a complicating double pyelonephritis. This was a very advanced case and operation was performed merely as a palliative procedure for the relief of pain. One patient left the hospital apparently improved after a cystotomy and radium treatment. He returned to his home in another state and has been lost track of. Another case treated similarly left the hospital apparently improved. However, he had an early recurrence, and was later subjected to a repetition of his previous treatment at another hospital. This patient at present, five months after his last operation, apparently has no further recurrence. This small group of cases well illustrates the formidable character of the lesion. Most of these cases unfortunately occur at a site which does not lend itself readily to radical excision. In the exceptional cases occurring at the summit of the bladder we believe that wide excision offers a very fair chance of cure. In the majority, however, radium applied through a suprapubic cystotomy wound seems to offer us our best chance of relief.

Of the ulcer cases, one was an extensive cystitis (streptococci demonstrated in the tissues) which was apparently cured by prolonged suprapubic drainage, after other measures had failed. The other was a small, punched out ulcer on the trigone seen in a woman who had had a nephrectomy for tuberculosis seven years before. The ulcer was apparently not tuberculous, and responded to topical applications of argyrol.

Four patients left the hospital with what would appear to be a rather unsatisfactory diagnosis of cystitis. In one case the cause was undetermined; one complicated a lesion of the central nervous system; one was a contracted bladder condition in a man who had been subjected to nephrectomy for tuberculosis several years before; and finally, a case occurring in a young man who had been in the past few years subjected to two cystotomies, one nephrotomy, and one perineal section in other hospitals. He came in with a contracted incontinent bladder. We were unable to discover the indication for his previous operations, nor were we able to relieve his present condition.

There were three cases of urethrotrigonitis in women. We believe that most of these cases fall in two groups; first, those caused by urethral stricture, and second, by some form of sexual psychopathy. Cases in the first group are much improved by urethral dilatation. The others are very intractable to any form of treatment.

There were three persistent suprapubic fistulæ, all following prostatectomy. Two closed after rest in bed with an indwelling catheter. One case was complicated by a very large ventral hernia. The hernia was repaired and the fistula closed with an excellent result.

Two diverticula of the bladder were excised according to the method outlined by Rathbun (1) with complete cure.

The foreign body was a wax taper introduced by a young man through his urethra for reasons best known to himself. It was found rolled into a ball and encrusted with urinary salts, and was removed by suprapubic cystotomy.

DISEASES OF THE PROSTATE AND VESICLES.

There were thirty-eight admissions as follows: Benign prostatic obstruction, twenty-eight; carcinoma of the prostate, five; chronic prostatitis, one; prostatic abscess, two; acute seminal vesiculitis, one; chronic prostatovesiculitis, one.

Of the twenty-eight cases of benign prostatism, one patient was sent to another institution two days after admission because of an unmanageable psychosis. One patient died seven days after admission for cardiorenal insufficiency, no operation having been performed. One patient died five days after preliminary cystotomy, from an acute cardiac dilatation. The other twenty-five patients were subjected to suprapubic prostatectomy, seven in two steps, the remainder at one operation. We prefer the one step operation whenever the patient will tolerate an indwelling catheter. We use local anesthesia to the point of enucleation. Nitrous oxide is used during that procedure, and is stopped the instant the enucleation is completed, so that the patient is conscious while the wound is being closed. This is felt to be an important part of the technic. There was one death in this series of twenty-five (hemorrhage on the second daý—packing—renal insufficiency—death on the seventh day). In one patient there developed complete retention after the suprapubic wound had closed. On cystoscopy was found a median bar left at the site of the prostatectomy. This was fulgurated, with complete restoration of function. One case (a two step) had a rather late prevesical infection requiring incision and drainage. The other patients made smooth recoveries.

The shortest stay in the hospital was one of twenty-seven days; the longest (the case of prevesical infection), seventy-five days. The average stay was thirty-four days. Prostatectomy for benign obstruction in properly selected and properly prepared cases would seem to be a relatively safe procedure.

Of the five patients with prostatic carcinoma, one died five days after admission (no operation being performed), two patients died following partial prostatectomy, one on the fourteenth day from uremia, and one on the twenty-second day from a double pyelonephritis. The other two made good operative recoveries. One has been lost track of, and one, six months after operation, was fairly comfortable, although obviously not cured. All these patients suffered from complete retention. One had radium applied with needles through the perineum before operation, two after operation. The results of treating cancer here, as in other parts of the urinary tract, are, to say the least, not brilliant.

Perineal section was done for one prostatic abscess; the other ruptured spontaneously into the urethra. We believe that the majority of these patients will recover in this way if treated conservatively. We have very few hospital admissions for this condition inasmuch as we have no venereal beds.

We see a considerable number in our outpatient department. They are given stock vaccines and advised to stay in bed at home, and to take hot sitz baths. Most of them return in a few days reporting a copious discharge with relief of other symptoms.

There was one case of acute seminal vesiculitis following influenza and complicated by retention.

Seminal vesiculotomy was performed upon one patient. This man had a systemic infection with repeated attacks of iridocyclitis, eventually resulting in almost complete blindness. A short chained streptococcus was isolated from the vesicles. Vesiculotomy was performed after all other measures had failed to stay the progress of the disease, and had apparently had very little if any influence upon it. This was a tragic case and illustrates one of the extreme possibilities of postgonorrhea vesiculitis.

Six cases of urethral stricture were admitted. Three of the patients had acute retention relieved by filiform and tunneled sounds, and were referred to the dispensary for continued treatment. We believe that uncomplicated stricture never requires operation. The other three cases were complicated by extravasation of urine. In one of the patients the extravasation occurred two days after suprapubic puncture. The other two men presented the usual picture of multiple sinuses and abscesses in the perineum and scrotum. These patients were operated upon and made good recoveries.

There were four cases of phimosis, one of paraphimosis, one punctured wound of the penis, and one carcinoma of the penis. This patient submitted to radical removal. Ten months after operation he was well and apparently free from recurrence.

DISEASES OF THE SCROTUM.

Four patients with varicocele and five with hydrocele were subjected to operation for radical cure. There were five epididymectomies for tuberculosis. Our attitude in the treatment of these cases has been conservative. Ordinarily operation is not advised except for persistent sinuses. Most of these patients have demonstrable lesions in other parts of the seminal tract, which can only be treated surgically by an extensive and radical operation with which we have had no experience. In operating we aim to conserve the testes. However, in one case occurring in an elderly man, we did a complete orchidectomy. The testes appeared normal, but on section showed numerous tubercles. We were rather surprised at this finding, and feel that perhaps some of our other cases might have had similar lesions which went unrecognized. One nontuberculous relapsing epididymitis was subjected to excision. One nontuberculous abscess of the testicle was incised and drained, and one traumatic epididymitis was healed by conservative measures. One orchidectomy was performed for a tumor of the testis which proved to be a gumma. This man had a negative Wassermann before operation. When the pathologist reported his findings another Wassermann was done and found to be four plus. This suggests the advisability in cases of doubtful tumors of the testicle of trying the therapeutic test before operation —even in the presence of a negative Wassermann. In one case of cryptorchidism, the patient was operated upon, with excellent result one year after operation.

One hundred and sixty-nine cases of syphilis were admitted one or more times for a test of the cerebrospinal fluid and for intraspinal therapy when indicated. Every patient with syphilis coming under our care has, at some time, a test made of the cerebrospinal fluid. This test comprises a Wassermann, globulin, cell count, and colloidal gold test. We employ the Swift-Ellis technic as a routine, and have been much gratified with the results obtained. This phase of our work has been discussed at length by one of our associates, Dr. Philip Goldfader, in a recent number of the NEW YORK MEDICAL JOURNAL. We had one fatality in this series. This was a young man with early cerebrospinal syphilis, who, one week previously had been given a Swift-Ellis treatment with no reaction. Eight hours following his second intraspinal injection he developed a severe chill followed by hyperpyrexia and delirium. He died forty-eight hours later with evidences of respiratory and circulatory failure. No autopsy was granted. There is evidently a risk attached to the procedure, although judging from the large number of patients treated with no reaction or disturbance following, it would not appear too great.

CYSTOSCOPIES.

In the cystoscopy room 378 cystoscopies were performed for the purposes of diagnosis and treatment. This is exclusive of cystoscopies performed in the outpatient department. The following conditions were diagnosed and treated.

Kidney: Renal calculus, nine; pyonephrosis, five; pyelonephritis, seven; nephroptosis, eleven; tuberculous pyonephrosis, two; unilateral nephritis, two; pyelitis, sixteen; hydronephrosis, nine; undiagnosed tumor, one; hypernephroma, one; adenocarcinoma, three; papillary carcinoma, one; horseshoe kidney, one; double kidney pelvis, one; anomalous kidney pelvis, one.

Ureter: Double ureter, one; stricture ureter, ten; kinked ureter, eight; pyoureter, one; calculus ureter, thirteen; papillary carcinoma, one; prolapsed ureter, one.

Bladder: Urethrotrigonitis, nine; postoperative tuberculous ulcer, one; postoperative tuberculous contracted bladder, one; postoperative cystitis, two; cystitis, primary ?, one; ulcerative cystitis, two; carcinoma, one; papilloma, one; diverticulum, two; stone, one. Extravesical conditions causing urinary difficulty, four.

Prostate and urethra: Benign prostatic obstruction, six; carcinoma prostate, two; chronic posterior urethritis, twenty; caruncle urethræ, one; polyp urethræ, two; papilloma posterior urethra, one; chronic prostatitis, two.

This list is prepared mainly for the purpose of showing the relative proportion of the various lesions included in this group, and is submitted without further comment. We follow a routine of examination in this department, which has been described in the NEW YORK MEDICAL JOURNAL (2).

We still follow this routine and are well satisfied with the results obtained.

In our outpatient department we administered 26,210 treatments to 1,689 patients. Our clinic operates daily from 1 p. m. to 3 p. m. for all genitourinary cases excepting syphilis. There is a syphilis clinic, for men only, one morning a week, from 9 a. m. to 12 m., and a similar clinic for women and children on another day, at the same hour. In addition to the above, there is a pay clinic from 5 to 6:30 p. m. corresponding to our 1 p. m. free clinic, and also pay clinics for syphilis one day a week each for men, and for women and children at 8 p. m. The revenue derived from this source is divided between the hospital and the doctors. The amount accruing to the hospital from this arrangement makes the clinic selfsustaining. The money paid to the doctors makes a small incentive for regularity in attendance. The men who work in the pay clinic must also work in the free clinic.

In this department we administered 2,058 intravenous injections of arsphenamine, and we have to report one fatality. This was a young woman with secondary syphilis. Examination of the heart, lungs, and urine had been negative. One week previous she had received four tenths grams of arsphenamine with no reaction other than a slight nausea. Almost immediately following her second dose which was of the same amount and the same type, and was given with the same technic, alarming symptoms developed and she died in thirty minutes in spite of all our efforts. The cause of death was anaphylaxis, following an intravenous injection of arsphenamine.

REFERENCES.

1. Rathbun: *Surgery, Gynecology, and Obstetrics,* July, 1919.
2. New York Medical Journal, September 20, 1919.

The Operating Room*

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The term surgical technic is broad enough to embrace all the mechanical processes of surgery; usually, however, it is employed to comprise the manual and instrumental steps of a surgical operation. Thus, when we speak of a surgeon's technic we mean the system and details evolved by his particular style of operating. After several years of painstaking attention to minutiæ, both of preparation and of performance, an operator acquires command of details and his fingers have become accurate and systematized for certain motions—he now has technic. Of course, the quality of this technic varies with the man. I have not mentioned speed, because I believe that speed is more the casual end result of technic than its absolute *sine qua non*. An operator may possess splendid technic and yet operate slowly and deliberately; it is quite within the realm of possibility for an operator to remove an appendix or an ovary rapidly and with poor technic. As a rule, however, the hands of the master of technic make the fewest possible movements in the performance of a given act, while the beginner or occasional operator proceeds with an *ubinam gentium sumus* manner, which results in loss of motion and waste of time.

Does the possession of technic alone constitute a surgeon? He who would be a surgeon should aspire to the acquisition of such accomplishments as precision in cutting, dexterity in ligating and skill in suturing, which, after all, are but manual processes to be mastered by practice. The surgeon must not only have technic, or what Treves (1) has called "the actual manipulative part of surgery," but he must also be skilled in diagnosis, know surgical principles, attempt prognosis, possess judgment and be proficient in aftertreatment. The surgeon either knows or, at least, makes an honest attempt to find out why he is operating; considers the reasons for and against such a procedure; ponders over the possible aftereffects. Whether he operates or not he shuns the sins against surgical principles. Having begun an operation he has sense enough to know when to stop. After an operation his interest in the patient does not lag, but he conducts the aftertreatment with vigilance and a sense of his deep responsibility. Hence it would seem that in the composition of the surgeon there is more philosophy than technic; more mind than hand. If I may again quote from Treves (1): "A shakiness of the hand may be some bar to the success of an operation, but he of a shaky mind is hopeless."

In 1804 Benjamin Bell complains: "Accordingly, in different hospitals we daily meet with good operators, but we do not often find surgeons possessed of that knowledge in the prognosis of chirurgical diseases which might be expected, that attention being seldom bestowed which is necessary to attain it" (2). Over a hundred years later Richardson (3) writes: "Some men have good judgment in the advising of operations, with but little skill in performing them; others have bad judgment in the advising of operations, but splendid technic in performing them; still others are not only poor diagnosticians and men of bad judgment, but they are clumsy operators." It is far from my purpose to minimize the importance of the mechanics of surgery. I am striving to accord to surgical technic the exact place in the domain of surgery to which it is entitled. I believe with Horsley (4) that "a beautiful operation that results in the death of the patient is not satisfactory surgery. While the mechanics of a surgical operation are important, they should not dominate the situation. The object of a surgical operation is to save life, to relieve pain, and to restore function, and these three things, in the order named, should always be kept in mind. The technic of an operation should be chosen not solely because it appeals to a mechanical sense, but because it is biologically correct. The changes and reactions of tissues after operation must be borne in mind when selecting the technic for any surgical procedure. It cannot be too often emphasized that surgery should be more a science than an art. A surgeon who is a dexterous operator and who skilfully amputates a leg that with patience and scientific application could be saved, is merely a good artisan, and is distinctly inferior to the surgeon who could save the leg even though he should be a bungling operator."

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When the hospital consists of several stories the operating room should be located on the top floor to facilitate the entrance of the northern light through the skylight, to protect other patients from the irritating noises incident to a surgical operation, and to minimize the amount of atmospheric dust—since the air near the ground contains more solid particles than the air surrounding the roof. The problem of lighting is among the first encountered when planning the operating room. For operations performed during the day time most authorities agree that the operating room should have illumination both from skylight and from window light. Perthes (5) says that even though the overhead light will suffice for most operations, the combination of vertical and side illumination is to be preferred; and for certain operations, as on the perineum, the side light is indispensable. "If one must choose between overhead light and side light it goes without saying that he will select the overhead light" (5). In this latitude the northern light is the most desirable. As Beatson (6) says, "From the north we get the steady, even light that the artist and the photographer prefer, whereas a southern aspect furnishes too direct and too powerful rays which embarrass operator and spectator—partly by the glare in his eyes and partly by the tissues in the depth of the wound being thrown into shadow." Light, however, exclusively from the north, may have its disadvantages, as shown by an experiment in the Massachusetts General Hospital. The staff of that institution, according to Wheelwright (7), insisted that all sunlight should be excluded and only the northern slope of the skylight was glazed and this was given a pitch of 71°. On hazy or cloudy days the light was reflected back into the room, but on bright cloudless days there was no such reflection and the light was found to be insufficient. They then corrected this defect by admitting light from a third of the area of the southern slope of the skylight. Wheelwright believes that in the small, north lighted operating rooms the window and skylight should be continuous, as in studio lighting. Sargent (8) calls attention to a very practical consideration when he remarks: "The greater the window area, the more difficult will be the problem of maintaining the proper temperature of the room." The same writer (8) does not believe that the temperature of the operating room should be allowed to fall below 65° F. Da Costa (9) states that the desirable temperature is 78° to 80° F. and that over 80° F. is too warm for both patient and surgeon. According to Gask and Wilson (10) the temperature of the operating room ought to be 65° to 70° F., or even higher. Ochsner (11) holds the ideal temperature to be 80° F. and Gibbon (12) considers "about 75° F." the proper temperature for the operating room. Before leaving the subject of natural illumination it is helpful to consider the advice of Haubold (13) who reminds us that "The skylight should be permanently sealed, as the ropes or reach rods necessary to open and close windows will, when manipulated during an operation, shake dust into the operative field. As moisture gathers on the under surface of a skylight, it should be furnished with a gutter at its dependent portion."

Profound thought and much money have been expended on the operating room's artificial illumination for night and for dull days. The great metropolitan hospital usually is provided with its own plant for the generation of electricity, but, even here, there have been irritating instances of the surgeon being suddenly left in utter darkness while in the middle of an operation—because the entire illumination of the operating room depended on a single fuse which failed. To avoid such accidents we should use several fuses connected with different groups of lights and regulated by separate switches. Of course, the failure of electricity may be due to conditions remote from the operating room and cause darkness throughout the hospital. To provide against complete failure of electricity every operating room should have in its equipment acetylene lamps and a plentiful supply of candles. "A collection of candles congregated on a board" (12) will serve admirably in an emergency. Acetylene must be used with care as there is some danger of explosion. If ether is present in the room any open flame must be placed high up "as ether vapor is heavier than air, and no explosion is possible until it reaches the level of the flame" (9). If illuminating gas is the source of light, the use of one of the various incandescent mantles will improve the quality of light as well as reduce the quantity of carbon dioxide and smoke (14).

Many excellent, even ingenious, methods of artificial lighting have been devised for the operating room. It will suffice briefly to refer to a few. The elaborate system invented by Leitz (15) has been used at Strassburg where it was installed about nine years ago. Here the light comes from an arc lamp stationed outside of the operating room and first strikes a parabolic reflector which transmits it through an opening in the wall of the operating room. Here it goes forward as parallel rays to be cleverly deviated and reflected by a hexagonal pyramid of reflecting surfaces and mirrors until it finally reaches the operating table where it illuminates an area of twelve to sixteen inches. In this light hands move without casting shadows. Bartlett's (16) method of illuminating the operating room was evolved after he had focused several automobile headlights on the field of operation.

Much inventive skill has been displayed in behalf of those who would witness surgical operations. Some years ago Balfour (17) described a mirror used in the Mayo clinic. This mirror was suspended over the operating table at such an angle as to give the spectator a view of the operative field. Of course, if the operator was right-handed his image appeared left-handed. Lesser (18) invented a system by which a surgical operation could be viewed through a mirror. Duncan's (19) "apparatus for providing with a complete view, and for securing photographs and moving pictures of operations" consisted of a camera, a mirror and a skillful arrangement of lenses. I believe with Gibbon (12) that none of these various systems of reflecting light by mirrors or of focusing light by metal reflectors compares in satisfaction with the overhead light. In order to avoid shadows the overhead light should come from several separate sources—"from an overhead collection of incandescent lights" (12). The danger of dust contamination from overhead lights may be greatly mitigated by the use of swing arms for the fixtures so that during the day the entire lighting apparatus may be pushed away from the region immediately over the operative field. No matter what type of fixtures is used—let it be as simple as possible. Both glass and metal should have daily application of a moist cloth.

The ventilation and heating of the operating room are difficult subjects to discuss without referring in some measure to the air as a factor in wound infection. After it had been established that contact was the chief cause of wound infection and that the air as a source of such infection was relatively unimportant, most surgeons concentrated their energies upon preventing anything bacteriologically unclean from touching the wound and almost ignored the air in planning their technic. They thought: "Actual contact of an unsterile object with the wound is the main cause of infection. Danger from the air, while not absolutely absent, is insignificant." Most of them, thereupon, ceased to take the air of the operating room seriously. This has not been the attitude, however, of some of the English writers, who emphasize the importance of mechanical ventilation with washed or filtered air.

Howard (20) informs us that at the London Hospital the air is washed by passing it through water, and then filtered through seventy-two screens of asbestos wool. "After being warmed by a steam radiator," he writes, "it enters the theatre through a special shaft, and is practically sterile. Before operations, superheated steam is blown over the theatre in order that any microorganisms may be killed, and the surfaces of the walls, benches, tables, etc., are damp. This dampness prevents the dust from being disturbed by people moving about." (20) Sargent (8) describes the Plenum system, as used at St. Thomas's Hospital: "An equable temperature is obtained without the presence in the theatres of complicated hotwater coils, and the absence of these means greater ease in maintaining the scrupulous cleanliness which is essential in a modern operating theatre; for not only is the air free from fog and dust, but there are fewer crevices where dirt may lodge than in theatres heated by watercoils. The essential feature of the Plenum system is that air adequately warmed and deprived of its grosser impurities, such as soot and fog, is forced by means of a rotary fan into the rooms, from which it can only escape by a system of ducts which lead to the open air. The pure air inlets are at some distance from the floor, the air in emerging from them being given an upward direction, while the extract ducts are near the floor; the air must therefore pursue a downward course in passing out of the rooms. The inlet and outlet ducts are so placed in the theatre that the general trend of the air is from the patient towards the spectators. There is no attempt at extraction, but since there is a slight plus pressure in all the rooms and the air will naturally find its way to the open by the outlet ducts, there is no fear that foul or foggy air will be drawn in through cracks or doors, for, even if a door is opened, the pure air will rush out but no unfiltered air will gain admission. The rooms containing the cleaning, warming, and air propelling apparatus are situated on the floor above the theatres. The air first passes over a series of steam pipes, next through a double screen formed of coconut fibre continually kept moist by running water, thence over the principal heating pipes, till it reaches the fan. The steam pipes will of course be used only in cold weather, while in summer the wet screen will somewhat cool the air which will have arrived at the fan freed from its grosser impurities and of a desirable temperature" (8).

Ochsner and Percy (14) tell us that artificial ventilation "may be accomplished by removing air in the room by means of fans, or through heated flues in which a draft is caused by the fact that hot air rises, because of its decrease in weight, due to expansion. The space occupied by the air removed from a room by either of these methods will be filled with air coming from without, either through openings provided at points at which the cold air has to pass over heated radiators, or through a main duct above the roof and necessary heating coils below to a settling chamber and then by smaller ducts to the various rooms. Another method consists in forcing air by the use of fans through a chamber heated by coils, thence through flues into the various rooms and wards. This plan may be employed alone or in combination with the methods just mentioned, by means of which the bad air is drawn out of the rooms. But this method has among its leading drawbacks this, that a constant temperature cannot be maintained, owing to external and internal variations and conditions. (There are always air spaces which contain air that can be displaced only with difficulty, while there are other spaces in which the air can be changed easily, consequently the fresh air will constantly be forced into spaces which are least in need of change, while other portions of the room will continue to contain vitiated air)." (14) The same authors consider that the best means of filtering the air are the means provided by nature. "Air which has been carried across a large body of water is practically free from impurities, because these have fallen into the water. Air near the tops of high mountains is pure because impurities fall to the ground before they are carried to these great heights. In tall buildings there are more microorganisms in the air entering from without in the lower than in the upper floors." "For these reasons," they continue, "it seems wise to obtain as large a piece of land as the means will permit, in the highest available location, and then construct the building as near the centre of such area as possible. The higher the building the better will be the chances of obtaining good air for the greatest number of patients. Shrubs and trees planted between the building and surrounding streets will serve to filter a considerable portion of the street dust out of the air before it reaches the building" (14).

The methods of air filtration described above are but the legitimate and logical results of Lister's antiseptic system. Originally a carbolic acid spray was used for the purpose of destroying the air germs of the operating room; today, filtration attempts to exclude such organisms from the air of the operating room. Inspired by Pasteur's studies on fermentation (21) and on spontaneous generation (22) Lister (23) (24) evolved a technic in which the air was considered to play the important rôle in wound infection. Lister did not aver that he was the first to use carbolic acid surgically. Indeed, in his letter, dated September 28, 1967, and appearing in the *Lancet* on October 5th of the same year, he says: "For my own part, I may say that, of all the gentlemen from Great Britain and both continents who have recently visited Glasgow, not one has ever expressed the slightest doubt that the system in question was entirely new; the novelty, I may remark, being, not the surgical use of carbolic acid (which I never claimed), but the methods of its employment with the view of protecting the reparatory processes from disturbance by external agency."

Several authors had used antiseptics before Lister's time. Agostino Bassi demonstrated the parasitic origin of silk worm disease in 1836 and Da Costa (9) tells us that Bassi used corrosive sublimate in the treatment of wounds several years before the birth of the carbolic spray. Oliver Wendell Holmes (25) in 1843 read a paper on the contagiousness of puerperal fever. Ignaz Philipp Semmelweis (26) in 1847 in his communication entitled "Most Important Experiences Relating to the Etiology of Epidemic Puerperal Fever in Lying in Hospitals," recommended that obstetricians wash their hands in a solution of chloride of lime. According to Reclus (27) Boinet used the word antisepsis in his *Treatise on Iodotherapy*, published in 1855, and he had found empirically that "the tincture of iodine, applied to old or recent wounds, may prevent or arrest purulent absorption." Da Costa (9) writes that Jules Lemaire in 1863 advocated the employment of carbolic acid in wounds in order to destroy germs; and quotes Monti (*Modern Pathology*) as authority for the statement that Bottini in 1866 used carbolic acid in suppurating and putrid wounds in the belief that germs were responsible for these conditions. With the exception of Boinet, the authors mentioned above used antiseptics with a more or less confused idea of the microbic origin of pus in wounds. Before Lister's time, however, there were many surgeons, who, having not the slightest conception of the parasitic source of suppuration, nevertheless chanced upon remedies now known to be antiseptics. Mumford (2) reminds us that the Good Samaritan poured oil and wine into the wounds of the stranger. The same pleasing author tells us that Paracelsus, who was born in 1493, employed silver sutures and lead washes; that Ambroise Paré (1510-1590), Fallopius (1523-1562) and others used alcohol washes; and that Sir Astley Cooper (1768-1841) applied bichloride of mercury in solution to ulcers and sinuses. Both Mumford (2) and Da Costa (28) declare that Dominique Jean Larrey (1766-1842), Napoleon's surgeon, treated suppurating wounds with *eau de labarraque* (solution of chlorinated soda).

Even though antedated by several surgeons in the use of antiseptics, the credit of inventing a system for the purpose of preventing wound infection belongs to Lister. Lister, acting independently and in ignorance of the work of a few others who had applied antiseptics in a haphazard fashion, excogitated the system which is the foundation of the present day asepsis. Bardeleben admirably sums up Lister's position in regard to antisepsis: (I translate the quotation used by Watson Cheyne) (29) "It has long been known, not only that a magnet attracts iron, but also that if a galvanic current be conducted through a wire encircling but not touching an iron bar, the iron bar becomes magnetized; but, nevertheless, the application to the telegraph of these facts—that an iron bar which has been magnetized by a galvanic current draws iron—constituted a discovery. So it is with the farreaching advance for which we must thank Lister. Joseph Lister has discovered neither bacteria nor carbolic acid, but, with enduring consequences, he applied to living, especially to wounded human bodies, the fact that decomposition does not occur without the influence of bacteria suspended in the air. (To avoid botanical refinements he prefers to say germs.) The result of this application was also a discovery, well worthy of being listed among the greatest advances of the medical art."

Lister sought in the air the cause of suppuration. "If we inquire," says he (23), "how it is that an external wound communicating with the seat of fracture leads to such grave results, we cannot but conclude that it is by inducing, through access of the atmosphere, decomposition of the blood, etc." Further on in the same treatise (23) we read: "Turning now to the question of how the atmosphere produces decomposition of organic substances, we find that a flood of light has been thrown upon this most important subject by the philosophic researches of M. Pasteur, who has demonstrated by thoroughly convincing evidence that it is not to its oxygen or to any of its gaseous constituents that the air owes this property, but to minute particles suspended in it, which are the germs of various low forms of life, long since revealed by the microscope, and regarded as merely accidental concomitants of putrescence, but now shown by Pasteur to be its essential cause, resolving the complex organic compounds into substance of simpler constitution, just as the yeast plant converts sugar into alcohol and carbonic acid." In another paper (24) he states: "In the course of an extensive investigation into the nature of inflammation, and the healthy and morbid conditions of the blood in relation to it, I arrived several years ago at the conclusion that the essential cause of suppuration in wounds is decomposition, brought about by the influence of the atmosphere upon blood or serum retained within them, etc."

It is not strange that Lister reflected upon the atmosphere as the possible source of putrefaction, when we consider the number of practitioners who, centuries before him, suspected the air as the source of many maladies. Turning over the pages of Watson-Cheyne's so justly celebrated work (29) on antisepsis we learn that Paracelsus taught that air should not come in contact with a wound; that the evil effects of air were feared by Würtz who wrote in 1596; that Fallopius dreaded air in wounds; that Paré thought the harm not so much due to air as to miasms contained therein; that Magatus in 1616 strongly emphasized the danger of air; that Belloste in 1707 wrote against air contact; that Col de Villars in 1741 recommends that dressings be changed as quickly as possible in order to lessen exposure to air; that Heister (1683-1758) attempted to prevent the entrance of air into wounds; that Pringle as early as 1761 feared the bad influence of air; that Benjamin Bell in his treatise on ulcers, published in 1784, speaks very strongly on the pernicious effects of air; that Hugh Munro, in 1792, entertained similar views; that Alexander Munro in 1788 wrote that the air was bad for serous sacs, chiefly because of its coldness, and in 1790 spoke of the impurity of the air; that Boyer in 1844 ascribed certain bad results in the treatment of wounds to the action of air.

Watson-Cheyne (29) writes that Delpech in 1816 made the first attempt at conducting an operation under the skin and performed subcutaneous tenotomy for the expressed purpose of preventing the contact of the air with the divided tendon; that Benjamin Brodie in 1817 divided varicose veins subcutaneously; that in 1839 Jules Guérin ascribed the good results of subcutaneous surgery to the exclusion of air from the wound; that Stromeyer performed his first subcutaneous tenotomy in 1831 and wrote his first report on the subject in 1833, clearly stating that the object of his operation was the exclusion of the air. According to Watson-Cheyne (29), various methods of excluding air from the wound (occlusion) had been tried not only by the ancients but also by more recent surgeons; and of the various materials employed for the purpose of converting open wounds into subcutaneous ones (gold beater's skin, caoutchouc, etc.) Jules Guerin, in 1844, considered gold beater's skin the best; the same year Langier wrote a paper "on the successful use of mucilages of gum Arabic and of gold beater's skin in the treatment of suppurating wounds"; almost synchronously (1844) Chassaignac advanced an identical method, claiming priority over Jules Guérin and declaring that under this method he, Chassaignac, had never seen a single case of hospital gangrene, phlegmon or erysipelas.

Rochard in his *History of French Surgery* (1875) comments entertainingly on Chassaignac's statement. Watson-Cheyne (29) quotes Rochard's remarks: "It is somewhat amazing to read similar assertions made of each new method which appears. Were we to take such statements literally we would be obliged to conclude that untoward results after wounds ought to be almost unknown in the hospitals of Paris, seeing that all the surgeons who practice there pride themselves on avoiding them by the method which they have adopted. On this point, however, it is difficult to know what to believe; and, as far as the diachylon dressing is concerned, Broca recalled having seen a woman die of erysipelas at Lariboisère, in the service of the inventor of the method, after she had been dressed in this manner following removal of the breast. Furthermore, Chassaignac did not hesitate to change his treatment by introducing there a new principle which speedily absorbs all the rest: we refer to surgical drainage." (I am responsible for the translation.) Chassaignac, usually credited with the introduction of the practice of drainage into surgery in 1859, never asserted that he had invented drainage. Le Dran (1685 to 1750) is quoted by Mumford (2) as saying: "The only cure for empyema is to operate and drain with a catheter." Le Dran, according to the same author (2), taught his students to leave open the lower angle of a deep wound. Mumford (2) further tells us that Benjamin Bell always used hollow drainage tubes in deep wounds and sinuses where there was pus and drained liver abscesses by strands of lint wicking; and that De Vigo, who wrote in 1514, used capillary drainage by means of wicks.

Previous to Chassaignac's time nobody had conceived of such a vast system of drainage, applicable to most pus cases and feasible in each region of the body. He systematized drainage and formulated minute instructions for its use. Let us read what Chassaignac (30), himself, has to say on this subject: "My investigations have been not only of the pathological history of suppuration but also and chiefly of the therapeutic side of the question, and I hoped to find better principles of treatment in the use of that which I call surgical drainage." "On the one hand, I have shown the possibility of directly changing purulent secretion into plastic secretion, making feasible primary union of the walls of an abscess; on the other hand, by availing myself in some measure of Gariel's tubes, I have extended their use to the treatment of the vast majority of purulent cases. The idea of substituting fenestrated, India rubber tubes for the ordinary Seton's belongs to me in a certain sense only. Ferri, M. J. Cloquet, M. Baudens, etc., used either fenestrated metal tubes or elastic cannulas. That which does belong to me is the conception of the greatest system of canalization ever applied to pus cases, together with exact and detailed instructions as to method of use for each region and, almost, for each individual step. All the germs of the invention of the means of drainage existed but the most inadequate ones were chosen and insisted upon by practitioners. The result was that, having devised neither the solid nor the hollow Seton nor lateral perforation of tubes, I was the first to use in practice, on a scale before unknown, these drains derived from Gariel's tubes." It is quite probable that by Gariel's tube Chassaignac meant the hollow rubber pessary which could be inflated and which was presented to the profession by Maurice Gariel (1812-1878).

To return to the subject of the influence of air on wounds, the elder Gross (31) informs us that collodion was introduced as a surgical dressing by J. P. Maynard of Boston in 1847—shortly after Jules Guérin and others began their experiments with gold beater's skin, etc. According to Watson-

Cheyne (29), Jules Guérin in 1866, Maisonneuve in 1867 and Lannelongue later devised pumps, the object of which was to keep the gases of the air away from wounds. These all failed and Alphonse Guérin in 1871 introduced his cotton wool dressing (*Pansement ouaté*) which was a method of occlusion, and far from aseptic, in the sense in which we use the term today. A. Guérin hoped that the cotton wool would act as a filter and thus exclude the noxious miasms from the wound (29). Mortality was high during the siege of Paris and Hervey, writing in 1871, tells us that from September, 1870, until February, 1871, A. Guérin saved but one case of amputation. Later (1875) Pasteur pointed out that bacteria and their spores were present in the cotton wool when applied and could be easily found in the discharge (29).

In 1878, Robert Koch in his *Researches on the Etiology of Wound Infections,* defined the microorganisms of several definite surgical diseases and gave the pathology of each, having cultivated the causative bacteria through repeated generations either artificially or in animals. The disappearance of the spray—now of but historical interest—was due to the growing conviction among surgeons that wound infection was due principally to contact of skin, instruments, dressings or foreign bodies with the wound—a view now held in most clinics. According to Carl Beck (32), a band of investigators, led by Koch, who studied this question from 1881 to 1888, decided that the microbes of the air were mainly of a harmless character. As Schimmelbusch (33) observes: "All the requirements for growth and multiplication of microorganisms—warmth, moisture, and nutrient media—are not present in the air, and for the schizomycetes, yeast fungi, and mould spores, the air is anything but a favorable place of maintenance." The same writer (33) quotes Stern who investigated the spray and found its purifying action very unimportant. Nor has the departure of the spray from modern surgical technic been deeply regretted by those who had suffered either locally or generally (dermatitis, carboluria, etc.) from exposure to carbolic acid.

Hektoen (34) writes that true dust infection demands that the bacteria involved withstand drying so as to be carried by the air currents in our houses, hospitals, and operating rooms. Dry microbes of this sort constitute the danger of dust infection. Strong currents and mechanical disturbances of accumulated material may set in motion larger particles which settle down rapidly, whereas minute particles of completely dried material can remain suspended in the air for three or four hours (34). Hektoen tells us that Neisser and others have divided microorganisms into three groups with reference to their infective power when dust dried: A, those that cannot live in air dried dust and therefore are incapable of causing dust infection (gonococcus, influenza bacilli, pest bacilli and cholera spirilla); B, those that survive drying and consequently are able to cause infection when transported in the air currents within the average house, i. e., one to four mm. per second (tetanus bacilli, bacilli of tuberculosis, anthrax spores, pyogenic cocci, meningococci); C, those that withstand drying, but are scattered only by currents stronger than those in the average house (typhoid bacilli, diphtheria bacilli) (34). Flügge (35), in discussing the effect of drying on bacteria, says: "When considering the quality of air germs it is of the utmost importance to realize that many varieties of bacteria cannot withstand the degree of drying out necessary for their transit through the air in the form of the finest, flying dust. Take fine dust filled with selected bacteria. Submit this dust to an air current of four mm. speed and eight mm. in height (the rate of air motion in the interior of a well ventilated living room). Without exception the following will perish: Cholera bacteria, pest bacilli, pneumococci, meningococci, influenza bacilli, diphtheria bacilli. These can be carried a great distance through the air in the form of droplets only. On the contrary, the following remain alive in the finest dust under the same conditions: Bacilli of tuberculosis, anthrax spores, staphylococci, sarcina, tetanus spores. Typhoid bacilli and streptococci take a middle position; they can be transported alive on somewhat larger dust particles and by strong air currents."

Flügge has done so much work on the question of air as a source of infection that I take the liberty of quoting extensively from his chapter on air germs. Flügge (35) writes: "The sources of airgerms are the various surfaces on which colonies of bacteria have been established—principally the surface of the soil as well as clothing, skin and the superficial mucous membrane of man. Bacteria do not get into the air from moist surfaces by simple evaporation; or from fluids by weak air currents. If such an air current be induced over a fluid or moist substance containing a selected, easily recognizable species of bacteria, and if then a collecting tube, curved in several places, be passed, the tube will not contain any of the germs selected for the test. But if an air current of more than four mm. speed strikes upon the surface of the fluid so as to cause wave formation, and the bounding of the waves against solid surfaces results in spray; or if spouting of the fluid, as a result of violent beating or smacking, causes superficial bubbles, then droplets of water and with them microorganisms can be transferred to the air. In the open, droplets are detached by the surging of the sea, by mill wheels and very frequently when strong winds shake rain soaked tree leaves. In dwelling rooms these droplets can be formed whenever fluid is poured out—when washing, etc.; but, what is most important of all, both well and sick, by sneezing, coughing and loud speaking, almost continually fling away from the saliva and mucous of the respiratory tract demonstrable, minute droplets which can contain living microorganisms. Once let loose, the further spread of these droplets requires air currents of but slight force. Air currents of the speed of from one to two mm. a second can carry the finest droplets a meter aloft.

"After the drying out of a colony of bacteria the change whereby the germs get into the air is not effected without difficulty. The capsules and intercellular substance having been encrusted in a drying mucous or albuminous material, the bacteria cling to their underlying surfaces somewhat firmly."

(To be concluded.)

The Out Patient Clinic

By J. M. WALLFIELD, M.D.,
Brooklyn, N. Y.

At the May meeting of the Associated Out Patient Clinics of New York, the status of the dispensaries was discussed from many points of view. As the subject appears to be of a good deal of importance, it may not be amiss to call the attention of the profession to the main features of the reforms which are intended to be introduced in the near future. I shall try to present the facts as they impressed me. I was not authorized by anybody to represent the above named body.

By taking a broad view of the subject, one must logically come to the conclusion that the out patient clinic is at least as important as the hospital ward, if not more so. The clinic is the place where overcrowding of the wards is to be prevented. The majority of the out patient clinic patients have as yet not reached a stage of morbidity which needs hospitalization, and by proper care should never be allowed to reach that stage. Prevention of disease is an important function of the community. The out patient clinic is one of the agents by which it may be accomplished, and certainly deserves consideration on the part of public spirited laymen and the medical profession.

It is suggested that more space must be allotted to the out patient clinic. A competent person possessing sound judgment should direct every new patient to the proper department. Such a person must have experience in classifying diseases. Old patients can be registered by anybody at all, but the newcomer is mostly unable to choose the proper department for himself, and must have somebody who is eligible to guide him; this is important especially where there are special clinics. A proper system of bookkeeping must be kept to receive, remit, and check up-fees. Naturally, under such circumstances, there will be an increase in expenditure which will force the administration to raise the admission fees accordingly. There will be a stronger incentive on the part of the public to abuse their privileges, and many not entitled to charity may try to get treatment at the out patient clinic. Such abuses will have to be remedied by proper means.

The number of patients treated must be limited in proportion to the space allotted and the number of physicians employed. This limitation is important for the patient, who will be more carefully examined, and will also benefit the doctor by giving him an opportunity to study the case and become more proficient in his work. When a service becomes too large for one man to attend to, it may be split into two separate services or the overflow of patients may be directed to another institution. The latter remedy is certainly not the best and not the most desirable one.

Many out patient clinics at present find it difficult to procure proper attendance on the part of the physicians, as there is no inducement for them to work. The remedy for this inattention is somewhat complicated and farreaching, but it is hoped that in the near future matters will adjust themselves in the right direction. We may dismiss the idea of paid out patient clinic doctors, as so far this plan has not proved satisfactory for many reasons. For the present the following suggestions are made: The out patient clinic and the hospital ward are looked upon as two branches of one tree and the connection between the two is kept as close as possible. When a patient from the clinic is admitted to the ward, he is accompanied by the history sheet, laboratory findings, and remarks of the physician under whose care he has been up to that time. This system helps to avoid duplication of work. The out patient clinic doctor must visit the patient in the ward at least once a week, though he is no longer responsible for the treatment, morbidity and mortality of the case.

The same patient, on returning to the clinic for aftertreatment, is under the care of a physician who has been continuously in touch with the patient. By following up the case, whenever necessary, by a social worker in the home of the patient, the doctor is in a position to study his case thoroughly and thus benefit both himself and his patient. Every institution must strive to have a social worker of its own, until such time as it may avail itself of the workers connected with the municipal charities. The physician of the out patient clinic, having free access to the history chart of the case in the ward, combined with his own observations, will have a wonderful opportunity for study.

The securing of a uniform standard of treatment and the avoidance of friction among physicians and surgeons are important factors in work of this kind. For this reason it is advisable that the junior staff of the out patient clinic should be drafted as much as possible from the exinterns of the same institution. The interns are usually acquainted with the methods of treatment of their chiefs. To cement the close connection between the out patient clinic and the hospital ward, it becomes imperative to appoint the attending physician or surgeon in the hospital as the chief director of the out patient clinic, his assistants as assistant directors, and a junior worker as the regular attendant of the out patient clinic. The chief, or his assistant when so delegated by him, must visit the clinic not less than once a week, when the junior worker presents the more interesting and complicated cases which he has collected during the week. At stated intervals clinical conferences should take place. This arrangement definitely places the responsibility for the out patient clinic upon the chief director during his term of service.

The junior worker is profiting by the consultations and conferences. Besides, he is given the privilege of treating his private patients in the hospital without interference from the chief. He automatically becomes a candidate for appointment to the hospital staff whenever there is a vacancy in the respective service. Medical men who have tried this plan of cooperation are very enthusiastic and predict great results from it. Of course, this is the ideal standard and will not be reached immediately, but a start must be made and made at once. The details, which are many, are to be worked out in the future. Such questions as vacations and substitutes for absentees for any cause must be left for future deliberation.

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The Tonsils*

By SAMUEL COHEN, M. D.,

Philadelphia,

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The tonsils are probably more frequently responsible for grave chronic ailments than any other organ of the body, and in attempting to understand their structure it is well to examine them from the viewpoint of the anatomophysiologist. I shall therefore present a résumé of the comparative anatomy and physiology of the tonsils.

ANATOMY AND PHYSIOLOGY OF THE TONSILS.

In all vertebrates, even the lowest, there is a collection of lymphoid tissue in the mouth. Birds, for instance, show a collection of lymph tissue in the throat, and reptiles, still more frequently, show a collection in the same region. Fish have a good deal of lymph tissue scattered about but not a distinct collection in the region of the base of the tongue. The horse has a rudimentary tonsil, not as compact as in man, and looks like a group of millet seeds. The horse is a nasal breather, the soft palate and uvula being so long as to separate completely the mouth from the nose. Peculiarly enough there is another animal dwelling in South America, the hyrax, which is also a mouth breather, due to the same elongation of soft palate and uvula, and this animal has the same rudimentary tonsillar tissue, or a large millet seedlike collection situated at the base of the tongue and at the upper part of the larynx and esophagus.

I wish to call attention to the fact that in animals that are pure nose breathers the tonsils are rudimentary, whereas in some of the other animals, which are pure mouth breathers or combined mouth and nose breathers, there is a more distinct and more compact tonsil. As far as I can find, no attacks of tonsillitis have been described in these animals. The tonsils of the cow are large and compact and instead of extending or opening into the pharynx, extend outward into the neck forming a large mass on either side. On looking into the mouth of a cow you cannot see the tonsils even though you pull the tongue out. The dog and his entire family, likewise the cat, the wolf, and the lion, have compact tonsils and capsules, just as in man, and some crypt formation. Attacks of tonsillitis are seldom or never seen.

Dr. Lentz, professor of anatomy in the veterinary department of the University of Pennsylvania (who has been kind enough to supply some of this information), states that he has found the tonsil inflamed in dogs only, when the nearby structures, such as the pharynx, were first irritated by the swallowing of some irritant, such as food that was too hot or a sharp spicule of bone. This irritation was followed by inflammation which spread to the tonsillar structure by contiguity. He has never seen pure tonsillitis without involvement of the nearby structures in any animal. The canine species are pure mouth breathers having large fauces and a correspondingly small soft palate and uvula. Dr. Lentz told me of a dog with a generalized lymphosarcoma involving almost every gland in the body and no tonsillar enlargement or abnormality on section, thus helping to show that even though the tonsil is lymphoid tissue, there must be come resisting power in it stronger than in ordinary lymph tissue. He also has seen several cases of Hodgkin's disease and no tonsillar involvement.

The pig has enormous tonsils, but as to attacks of tonsillitis, I could find none reported, nor could any veterinarian tell me of a case in which there was difficulty in swallowing due to disease of these structures. Rabbits also have fair sized tonsils, but no abnormality could be found in them. Monkeys, so very near to man in morphology at least, have tonsils, which macroscopically and microscopically are very similar to those of man, but I could find only one case of tonsillitis in these animals. Dr. Fox, of the Philadelphia zoological department, told me that he had never treated a monkey for tonsillar trouble. Many animals, including monkeys, have attacks of acute rhinitis with all the symptomatology seen in man, but no difficulty in swallowing due to tonsillar disarrangement. It is of course possible that animals may have attacks of tonsillitis more frequently than we give them credit, because of the enormous difficulties in communicating with them, and the difficulty in interpreting their symptomatology, thus overlooking such attacks or diagnosing them incorrectly.

Why disease of the tonsils occurs so frequently in man and so rarely, or not at all, in the lower animals, is a question of deep import, the solution of which will prove of infinite benefit to the human race. A common observation and one which I hope you will be impressed with as being important in our attempts to clarify the subject, is that the tonsils become more developed the higher we go up in animal life, reaching their height in man. What has man done, or what circumstances caused the growth of this organ in man during his stages of evolution? Let me now give a short history of the tonsillar studies by different investigators.

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*Read before the Medical League of Philadelphia and the Brooklyn Pediatric Society.

In 1543 Versol first described the tonsil. In 1724 Santorini first talked about the adenoids. In 1865 Wharton investigated the tonsillar region. Wharton, Shauffenberg and Morgagni spoke of the glandular tissue at the base of the tongue as tonsillar tissue. Kaff describes a ring of adenoid tissue at the pharyngoesophageal inlet and compares it very well to that found in the wolf. Lacouchie is considered as the first one to give a complete description of the tonsil. Dr. Schmidt calls attention to the fact that the lymph tissue is not only limited to the region of the base of the tongue, but in other animals like the hog the entire "mouth is one mass of lymphoid tissue down to the esophagus." He apparently is trying to prove that this vast amount of lymphoid tissue is in this region for some protective purpose.

It remained for Luschka, however, to separate the different collections of lymph tissue at the base of the tongue and to describe so accurately the pharyngeal tonsil or adenoids, as to become honored by having his name attached to this organ. (The pharyngeal tonsil, adenoids, or Luschka's tonsil.) Waldeyer, studying these structures, notes that the ring of lymphoid tissue at and above the inlet of the pharynx and larynx was placed vertically and described it as a vertical ring of mucous membrane, infiltrated with lymphatic tissue and crypts. Since then this ring has been called Waldeyer's ring. Oppel quotes Bickel, saying that he considers the lymph tissue reaches its highest development in the tonsils. It is a good rule, when studying the tonsils, to consider them as part and parcel of Waldeyer's ring. (The circle of glandular tissue situated vertically at the entrance of the food and air tracts, comprising the pharyngeal tonsils or adenoids, the lingual and the faucial tonsils.)

The faucial tonsil lies in a recess called the sinus tonsillaris, formed externally by the superior constrictor muscle, anteriorly and posteriorly by the divisions of the lower lateral folds of the soft palate. The posterior portion is important, as it blends with the pharynx near the Eustachian tube and helps control the patency of the tube. It aids in opening the tube during the act of swallowing. Its injury, which is easily accomplished, results in imperfect tubal aeration, thus often leading to complete tubal closure with resultant rarification of air in the tympanic cavity, edema of the mucosa, chronic catarrh, and so on. It is to be remembered that the pillars being part of the soft palate, their injury with resultant scar formation may even interfere with proper swallowing function, causing an overactivity of the muscles concerned, thus resulting in chronic hyperemia and catarrh of the pharynx and larynx. Thus what is considered a simple operation may result in much harm. These statements are made in order to impress you with the importance of removing the tonsils with the least amount of injury to the surrounding musculature.

The tonsils are ovoid structures, made of glandular tissue with some important distinctions. First, the invagination of the surface epithelium forms the socalled crypts. These crypts have their apices terminating in or very near the capsule, and their dilated extremities open into the inner and upper noncapsular surface of the tonsil. Some crypts divide in to two or more tubules. Second, the tonsil is covered on one side with mucous membrane and on the other by a fibrous capsule. (A lymph gland is completely surrounded by a capsule.) Third, lymphatic vessels go through an ordinary lymph gland, but in the tonsils lymph vessels originate.

Dr. G. B. Wood asserts that the tonsil has afferent vessels only and that the crypts are lined with a specialized epithelium which may change into lymphocytes. He also calls attention to the fact that the tonsil drains mainly into one gland situated beneath the anterior border of the sternocleidomastoid, where the posterior belly of the digastric crosses it and calls it the tonsillar lymph gland. In the connective tissue around the crypts, leucocytes are always found *en masse,* as at the border of a country preparing for war. The rapidity with which the leucocytes multiply in this region has resulted in the follicles found here being designated as germinating follicles.

The epithelium in the crypts is constantly being shed or rather pushed off by the new growth beneath. This occurs in all surface coverings. This shedded epithelium, or socalled tissue débris, falls to the bottom of the crypt and if allowed to remain in the crypt soon undergoes some form of degeneration, probably fatty. These masses, it seems to me, are pushed out of the crypts by the migration of the leucocytes from the surrounding tissue and by the compression of the three muscles forming the tonsillar sinus during the act of deglutition. Physicians who see a plug of tissue débris coming out of the tonsillar crypt and diagnose tonsil disease on this sign alone are wrong in their diagnosis. One might call all ear canals diseased, if a driblet of wax is seen coming out.

In the upper part of the tonsil is a depression called the supratonsillar fossa (the remains of the pharyngeal portion of the second visceral cleft). This depression has several crypts opening into it, which openings are often partly closed by a fine fold of the anterior pillar called the operculum. This explains why most peritonsillar abscesses have their origin in this region. This was especially noticeable in recent epidemics of peritonsillar abscesses when the posterior pillar was more frequently involved than in the usual run of cases.

There are two maximum collections of lymph glands in the human body. One is around the throat (Waldeyer's ring), and the other at the ileocecal valve. These are possibly the most important portals, where infection may enter the economy. Are these glands so situated as to be an advance guard for the body's protection?

The blood supply of the tonsil is principally the tonsillar branch of the facial, which runs in the superior constrictor muscle and breaks with small branches just before piercing the tonsillar capsule. The other vessels run in the musculature of the anterior and posterior pillars, again calling attention to the fact that injury to the musculature around the tonsil increases the danger of the tonsil operation.

The tonsil appears in the human animal at about the fourth month of intrauterine life by an invagination of the epiblast into the hypoblast. It commences to grow rapidly at about the age of one year. The tonsil atrophies at a certain period, some authors putting it at puberty, others at about the ages of twenty-five to thirty years. My experience is that, if the tonsils are not diseased, they commence to diminish in size noticeably around puberty.

The question of whether the tonsils are normal, pathological, or simply vestigial organs is a mooted question, each theory having many advocates. When we take into consideration that the tonsils are found in all animals from the reptilian stage up to man, and that in man they are more complicated than in the lower animals, the vestigial theory must be ruled out. To assert that they are pathological organs entirely is simply another way of stating that Nature has erred in her manufactured product and has repeated this error throughout almost the entire animal kingdom. This is highly improbable and I need not defend Nature's methods any further.

Many investigators believe the tonsil has some function, even though it may be a limited one. They assert that the crypts are traps for bacteria or other enemies of the economy. To me it seems that the tonsils are normal organs, with a definite protective function in our economy. The tonsils are trying to readjust themselves to the new and changing conditions brought about by civilization processes. They are unable to cope with the new conditions, their resistance is soon overcome, and they quickly become useless and even harmful when left in the body. If we consider that Nature always has some definite reason for placing certain organs in certain places, we must go back to the lower animals and find an excuse for the tonsil being called into existence.

The tonsils are not found in fish but are noticed in some reptiles. Reptiles are fish which have raised themselves out of the water and become air breathing animals. This change from water to air breathing must have caused considerable additions and subtractions in the body, and one of the additions seems to have been the tonsillar tissue. Nature has apparently attempted to place an additional guard. In our precivilized animal existence this guard may not have intruded itself to any extent on our notice, as abnormalities among wild beings and animals are very rare. (The animal with an abnormality is often weaker than the normal and is soon gotten rid of.) Man, undergoing a process of civilization, living always under new, unnatural, congested conditions, has more quickly developed these organs, so attempting to protect him from invasions, only to find them too weak to cope with so many enemies. Almost from the beginning of our prenatal existence, the tonsil often becomes a liability instead of an asset.

Permit me to detail some of the theories at present in vogue as to tonsillar activity.

Dr. Wright has shown that dead matter like carmine is readily absorbed by the tonsil, but not so with bacteria. He also demonstrated that carmine remaining on the surface of the tonsil was more easily washed away than bacteria. Bacteria seem to have some cohesive quality toward living cells, but as long as these cells were in normal health they could not penetrate the tissues. Whether the epithelium evolves some substance which dissolves foreign matter is questionable. Wright believes that some general bodily disturbance, such as that caused by fatigue, exposure or gastrointestinal troubles, causes some sympathetic nervous derangement, which in turn produces alterations in the cryptic epithelium, this epithelium protecting the system against bacterial or other poisonous invasion.

Pluder asserts that the function of the tonsil is to produce white cells, but the amount produced is so small in comparison with the other blood producing organs as to make this organ of very little importance when the question of removal comes up for consideration. When asked why this blood producing organ was near the surface of the body while the other blood producing organs are deeply situated internally, he states that it is simply a coincidence and calls attention to the fact that the blood producing organs in many lower animals are found in the mouth.

Allen asserts that the function of the tonsil is to replace that of the thymus, which usually disappears at about the time the tonsil commences to grow. In other words, the tonsil alternates with the thymus. He also says that all over the body we shall find that blood producing organs do not work simultaneously, but alternately.

The preeminent topic among medical men today is the endocrines and according to some the tonsil produces an internal secretion. This theory seems hardly plausible, as no cases have been reported so far as I have been able to ascertain in which general disarrangement resulted from the removal of these organs.

Dr. G. B. Wood states that the production of lymphoid cells in the follicles of the tonsil causes a lymphoid current in it and that this lymph current is running through the lymph radicles toward the periphery, except when an accidental rupture of the cryptic epithelium exists. He also believes that toxins may be absorbed directly into the blood stream, producing general symptoms without enlargement of the glands of the neck. This is quite possible considering the rich blood supply of the tonsils.

Let us now consider some pathological phases of the tonsil. It has been proved that in about ninety per cent. of the patients dying from pulmonary tuberculosis involvement of the tonsils has been found. In four to five per cent. of tonsils removed from children tuberculous invasion of the tonsil was found. Cases of generalized septicemia following acute tonsillar infection are too numerous to need verification, but I will cite two cases.

CASE I.—Several years ago I was called to treat a boy aged seven, who, in addition to a rheumatic infection of the joints following an attack of tonsillitis, soon manifested acute endocarditis. Rest in bed for several months, followed by removal of the tonsils, resulted in a complete cure of both heart and joint infection. The patient is well today.

CASE II.—Another case of interest, although it worked the other way, was related to me by a physician. A young girl, aged eleven, never ill before, heart normal and healthy, was seized with an attack of follicular tonsillitis, which cleared up in a few days. Three or four weeks later, the patient was brought to the doctor's office with the complaint that since the tonsillar attack distinct difficulty in breathing was noticed, interpreted by the mother as weakness. An examination revealed the source of trouble as an acute endocarditis. After a rigid rest in bed for ten weeks, the patient was able to go back to school and with extraordinary precautions as to exposure, managed to be well for about six months, when another attack of endocarditis appeared, sending her to bed another ten weeks. The third attack that followed in a few months was complicated with pneumonia, thus concluding the tragedy in the course of one year. I believe that if the tonsils had been removed, this patient would probably be alive today.

Let me quote some interesting statements gathered from the literature. H. R. Lille and H. R. Lyons report eighty-seven cases of myositis in which the removal of the tonsils caused an improvement in seventy-one. In one hundred and thirteen cases of arthritis, eighty-eight were improved by the removal of the tonsils. Eight years was the average length of time these patients had their ailments prior to operation. Of these two hundred patients, one hundred and fifty-four were unable to work; after operation eighty-two were able to work. Only thirty-three of the two hundred cases had any other treatment besides tonsillectomy. All these tonsils were examined on removal and found diseased. Other possible sources of infection should be examined.

J. M. Walsh, taking a leucocyte count in two hundred cases of chronic tonsillitis in children under ten years of age, found a leucocytosis in all. The count came down after tonsillectomy. Many cases of pyorrhea and tooth abscesses show improvement following the removal of tonsils.

How are we to judge when tonsils are diseased or not? Before attempting to answer this question, permit me to call your attention to the fact that an examination of the tonsils by simply inserting a tongue depressor into the mouth and looking at the tonsils is insufficient and almost useless. One should not only inspect the tonsils but should palpate them, that is, attempt to retract the anterior pillar to see if adhesions are present, and if so, previous attacks of tonsillitis or peritonsillar abscess must have occurred to cause these adhesions. Next turn the end of the tongue depressor against the anterior pillar and push back and out. This will cause the tonsil to rotate on its posterior pillar, exposing and opening some of the crypts, so expressing some of the secretion or pus that may be present. If pus is found the removal of the tonsils is indicated. Here let me repeat that I believe some exudate from the tonsillar crypts are normal, and unless pus is distinctly present, I would not advise operation on this sign alone. One must use wise judgment in these cases, paying careful attention to the history.

There is no doubt in my mind that there are too many tonsillectomies being done at present.

1. I would not advise the use of this squeezing method, even with a specialized instrument, in order to treat diseased tonsils, unless for any reason it is inadvisable to risk operative intervention, whether done under local or general anesthesia.

2. The tonsil should be removed when there is a history of frequent attacks of tonsillitis.

3. A history of even one attack of quinsy requires the removal of the tonsils.

4. Whenever the tonsils are so large as to obstruct breathing, or impair voice or speech, the socalled obstructive tonsil removal is indicated.

5. If one attack of tonsillitis is followed by some general disturbance, such as rheumatism, cardiac trouble, or arthritis, etc., early removal is advisable.

6. Embedded tonsils, especially those pushing the soft palate upward and so interfering with Eustachian drainage; the removal of the tonsils should seriously be considered.

7. In any generalized chronic ailment, when the tonsils look suspicious, with some enlargement of the glands of the neck, and other possible sources of infection, such as the teeth and sinuses, can be ruled out, remove the tonsils.

8. In ear conditions, such as chronic otorrhea, pains referred to the ear, even without any appreciable change in the drumhead, are often due to Eustachian blockage by the tonsils or adenoids, and their removal should be seriously considered. Some specialists advise a tonsilloadenoidectomy if the ear discharges longer than three weeks. (This time limit is questionable.)

9. Enlarged glands, especially when tuberculous, should have the most probable portal of infection removed; therefore do a tonsillectomy.

10. In some cases of keratosis tonsillaris, when the horny material is limited to the tonsils only, their removal is the quickest cure of the condition.

People are entitled to be freed from this avenue of infection, if it can be done without seriously endangering their lives. Therefore, when the tonsils have been established as the most probable source of infections, removal is the logical thing to be done.

In conclusion, permit me to describe what I consider a good tonsillectomy. First, the tonsils should show, on removal, a complete capsule on one side and on the other the cryptic mucosa. If any break is noticed, the probability is that some part of the organ has been left in the tonsillar recess. The results of the operation cannot be noticed immediately. They can best be seen several months later. It should be remembered, however, that even with the best technic and at the hands of the most expert operators, the ideal results often are not obtained.

To repeat, therefore, the first essential to success is to remove the tonsil and capsule completely. Second, the tonsillar recess should be clearly discernible. Third, the anterior and posterior pillars should be plainly seen and free from adhesions. Fourth, no scar tissue should be noted anywhere in the throat. Fifth, the uvula should be intact.

Most operators will admit having been frequently delighted with their operative technic soon after its performance, only to be chagrined several months later on finding the structures matted together or a piece of tonsil tissue left. A recurrence of tonsillar growth means that some part of the tonsil was not removed.

The operation of tonsillectomy unquestionably presents dangers, but it is worth taking the risk in view of the benefits derived therefrom.

Experimental Rickets in Rats*

By PROFESSOR V. KORENCHEVSKY.
London.

The results of my experiments and their technic have been described (1). Since then I have only increased the number of rats in several groups of my experiments and added only one new group, on the influence of parathyroidectomy on the skeleton of rats. This being the case, I will not trouble you with a detailed report. The number of rats, which have served me for various experiments, is indicated in Table I. I summarize results obtained by me in the following conclusions.

The results, obtained by me, agree in general with the results of the experiments of Mellanby on puppies and partly those of MacCollum and his coworkers on rats.

GENERAL REMARKS ON ANATOMY AND PATHOLOGY.

Solely, an anatomical pathological investigation of human rickets and osteomalacia cannot give the proper conception of the pathological anatomy of these diseases in their various forms. Experimentation alone can establish the origin of these forms from the same cause.

TABLE I.

Category of rats	*Rats investigated histologically*		*Rats in which calcium and water were investigated in the bones*
Control rats on diet N	35		23
Rats on diet N — SM	7	28	—
Rats on diet N — Ca (0.04 per cent. Ca)	21		17
Rats on diet — A	49		28
Rats on diet — A — SM	7	38	—
Rats on diet — A — Ca	31		20
Rats on diet N — P (0.22 per cent. P)	6		6
Rats on diet — A — P	8		8
Castrated rats	40		22
Rats deprived both of sexual glands and spleen	6		—
Parathyroidectomized rats	24		24
Rats that have received with food or subcutaneously a mixture of intestinal bacteria	5		4
Total	239		152

For the test following we shall denote the diets by the following letters:

N = Normal diet.
N-Ca = Normal diet deficient in calcium.
— A = Diet deficient in vitamine A only.
— A-Ca = Diet deficient both in vitamine A and calcium.
N-P = Diet deficient in phosphates.
— A-P = Diet deficient in phosphates and vitamine A.
SM = Saline mixture N 185 of McCollum.

A proper classification of these diseases can be made by considering only the etiological factor: because the same pathological pictures can result from different causes.

The experimental results, obtained by me, lead me to the belief that for the anatomical pathological diagnosis of rickets and osteomalacia there is only one essential, namely, retardation or absence of lime deposition in newly produced bone, giving a picture in which osteoid tissue is evidently increased in amount with sharp differentiation between it and calcified bone.

Therefore, although changes in the proliferating cartilage aid the diagnosis, yet they are not an essential factor: the increase and disorganization of proliferating cartilage depend directly upon the rate of growth of the bones; the deposit of calcium in the zone of provisional calcification depends on one hand upon the retardation or absence of the process of lime deposition and on the other hand upon the rate of growth of the proliferating cartilage and of the dissolution of the latter by bone marrow.

Changes in the periosteal and endosteal growth of bone, which goes on throughout life, can be observed independently of any changes in the endochondral growth of bone. This can be seen most strikingly in those cases of experimental rickets in which growth of the animal has ceased, while no changes are observed in the cartilage.

The formation of osteoid tissue around the trabeculæ of the subchondral spongiosa occurs in the same manner as that around cortical bone, namely, through the activity of osteoblasts. Therefore in rickets the production of osteoid tissue and its calcification occurs simultaneously in both regions.

INFLUENCE OF AGE.

In my experiments rickets was produced in rats provided the age was not greater than three to five weeks at the beginning of special feeding.

When feeding was started at the age of about two months a picture more characteristic of osteomalacia resulted; namely, no marked changes in the proliferating cartilage, very often accompanied by deposition of lime salts in the zone of provisional calcification. Therefore my experiments collaborate the view that there is no essential distinction between rickets and osteomalacia, the only modifying influence being age.

In rats at the age of three months or older, if a rickets producing diet is administered for about three months, changes are produced in the skeleton, but these are either not significant or show slight signs of osteomalacia.

CONFINEMENT.

Confinement in small cages does not evoke rickets in rats.

INFLUENCE OF SOME INTESTINAL BACTERIA.

The introduction of live cultures of Bacillus perfringens, Bacillus sporogenes, and Bacillus bifermentans with the food, and of Bacillus sporogenes and Bacillus bifermentans subcutaneously, produced no visible effect on the development of rickets in rats.

INFLUENCE OF A DIET DEFICIENT IN CALCIUM ONLY.

A diet deficient only in calcium produces a general disturbance in the body, especially in younger animals, namely calcium starvation, which is characterized by changes in the skeleton, retardation of growth, very often accompanied by gastrointestinal troubles and an increased nervous excitability.

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*From the Department of Experimental Pathology, Lister Institute. Report before the Royal Society of Medicine on December 6, 1921.

Changes in the skeleton can present resemblances to rickets, especially when the young rats have originated from a mother kept on the same diet during lactation. On an N-Ca diet the changes produced in the skeleton are due to insufficient calcium intake. In such bones the deposition of calcium is seen in the greatest part of the newly produced bone, but chemical investigation shows a very marked reduction; up to sixty-four per cent. below the normal calcium content. These two facts considered in conjunction with certain histological peculiarities manifested by such bones demonstrate that a reduced amount of calcium had been distributed diffusely throughout large masses of bone tissue.

The case with which calcium is deposited notwithstanding the reduced amount of calcium in the body leads one to doubt that calcium starvation alone can be the cause of human rickets as thinks Professor Aron and others.

Although there are differences between rickets and the condition produced by calcium starvation yet one can assert that calcium starvation can play some rôle in the etiology of human rickets or a special form of the disease. The manner in which the child develops the condition of calcium starvation is demonstrated principally by Aron and Schabad. This is as follows:

a. Normal human breast milk contains only the adequate amount of calcium, which the child requires during the first few months of life.

b. According to the investigations of Aron and Seemann the milk from mothers of rickety children seems to be poorer in calcium than that of the mothers of normal children, especially if the percentage is calculated with relation to organic content of the milk.

c. A normal amount of calcium in the milk may prove insufficient for the child if its growth is abnormally great on account of overfeeding.

d. Although the cow's milk contains a great amount of calcium yet according to the opinion of Voit, Fichl, Schabad and others, it is a form much less available for the child.

e. The digestive disturbances can also effect the power of absorption of calcium.

— A DIET.

Chemical analysis of the bones shows that in rats on — A diet the skeleton becomes poorer in calcium and richer in water.

In rats which continue to grow and do not starve upon a diet deficient in vitamine A, the picture of slight rickets or osteomalacia and less frequently of moderate rickets is produced. The rickety changes manifest themselves more in the production of an abnormal quantity of osteoid tissue than in pronounced alterations of proliferating cartilage.

Starvation, cachexia and cessation of growth are associated with a diet very markedly deficient in vitamine A and administered for a long period. These cause characteristic alterations in the anatomical pathological picture of rickets, previously produced by such a diet: the production of new bone is hindered and a portion of the body tissues, including bones, is burned in order to produce the necessary energy. As a result there cannot develop or there develops only to a slight degree the classical bony changes of rickets, namely, a marked increase in the amount of proliferating cartilage and osteoid tissue. On the one hand the increased resorption of bone, and, on the other hand, the lack of production of new bone combine to produce osteoporosis, the severity of which depends directly upon the degree of the above mentioned factors.

Typical rachitis florida I have produced in the young if the parents are fed upon vitamine A deficient diet during conception, pregnancy and lactation (experiments on eighteen rats) and to a lesser degree in the young of a mother fed on such a diet during lactation only (experiments on six rats) but even in such rats the rachitic changes may be modified by varying degrees of osteoporosis caused by varying degrees of starvation, cachexia and cessation of growth.

Therefore, experiments on the feeding of parents on food deficient in vitamine A or calcium during conception, pregnancy and lactation suggest that this may start disturbances of metabolism in the child which, if the deficient dietary be continued after birth, result in serious disorders of the skeleton. Therefore an inherited predisposition may be one of the contributing factors in the etiology of rickets. The statistical studies of Siegert, Ferguson and Findlay do not hinder such a conclusion.

Based upon the fact that gradual gradations between pronounced osteoporosis and rickets florida can be obtained in animals fed on vitamine A deficient diet, it is reasonable to conclude that rickets is present in all these cases. In osteoporosis it is present in latent form and would become manifest if starvation, cachexia and impairment of growth would be removed. Not only my experiments on rats, but also clinical observations on human beings are favorable to the view that rickets might be present in latent form in cachetic individuals that are not growing.

Vitamine A has an important relation to the metabolism of calcium in the organism and particularly in the bones, and therefore to the etiology of rickets.

— A-CA DIET.

The changes typical of rickets or osteomalacia occur most readily and most frequently in rats kept on a diet deficient both in vitamine A and calcium.

The changes brought about in the skeleton as a result of the cessation of growth, starvation and cachexia, in rats on — A diet occur also in rats on — A-Ca diet.

CASTRATION.

Castration performed before the commencement of feeding has no marked influence on the chemical and histological changes in the skeleton of rats fed on normal diet, on diets deficient in calcium or vitamine A, or deficient in both.

PARATHYROIDECTOMY.

In rats on N, N-Ca, — A, — A-Ca diets the removal of parathyroids does not seem to make a marked difference upon the changes in the skeleton, studied chemically and histologically.

In my experiments parathyroidectomy in rats on a normal diet has produced similar but not as marked macroscopical changes in the teeth as those described by Erdheim. Each individual deficiency in the diet mentioned above produces the same macroscopical changes in the teeth.

CONCLUSIONS.

Up to the present time Morpurgo, Findlay, Mellanby, McCollum and his collaborators, and I, have produced experimentally, typical rickets or osteomalacia in different ways. Do these results solve the problem of human rickets? Certainly not. It is necessary first to prove that all of these play a rôle in the etiology of human rickets. The experimental results serve only to indicate some of the possible ways in which the problem might be solved.

My experiments have shown that the vitamine A deficiency alone is capable of causing rickets. They also indicate the importance of calcium deficiency, especially in combination with deficiency of vitamine A.

The question arises, this being so, why curative treatment of rickets by supplying codliver oil and lime salts is not invariably and rapidly effective.

I propose to suggest certain possibilities in this connection.

1. In 1920, Grosser published a report of his very careful and extensive experiments, studying the metabolism of rickety children daily for sixty-five days in each case. He found in certain cases of rickets only some of the organic calcium salts, and these only when given subcutaneously, could be permanently assimilated. This indicates the importance not only of the special form of lime salts but also of the method of administration.

2. By analogy I think it likely that the assimilation of vitamine A by rachitic children may be influenced by similar conditions. I suggest that subcutaneous injection of some specially favorable forms of vitamine A may bring out some new facts bearing upon the treatment of this disease. I earnestly draw the attention of clinicians to these possibilities.

3. Up to the present time there have been too few attempts to treat rickets by the administration of a combination of lime salts with vitamine A and perhaps oral administration is unsuitable on account of the production of calsium soaps. Hence I suggest the subcutaneous injections may give interesting results.

REFERENCES.

1. Korenchevsky: *British Medical Journal,* 1921, 2, 547.

Significant Signs in Acute Surgical Diseases in Children

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It was long believed that the American Indian was possessed of keener eyesight than the white man, and examples were given of his ability to discern objects out of the range of vision of his white companion. Careful tests of the vision of hundreds of Indians failed to show that their eyesight was any better than the well recognized average for the white race. It was shown, however, that he, like the sailor for example, was able to identify objects with which he was familiar at distances quite impossible to anyone not familiar with them. He had in his mind a definite image of the thing he was expecting to see and therefore recognized it earlier than his white competitor. This knowing what to expect gave him a reputation for great keenness of vision. In the same way, the diagnostician having in mind the significance of the symptoms which he observes, will arrive at a diagnosis more promptly than if he merely takes the separate symptoms and attempts to build from them a picture of the disease.

We are now suffering from the advantages of too many laboratory tests and no one is willing to deny any patient the advantages of any or all of them, when such advantage can be proved. But this paper is an appeal for a return to first principles in the recognition of disease, for a return to our clinical sense, and above all for discrimination in the value of the signs of disease. It can profit us nothing to know all about the patient except what is the matter with him. One repeatedly sees the utter futility of the delay of an hour for a blood count when the evidences of appendicitis could not have been either minimized or increased by the returns. Exactly as the laboratory often furnishes us with a complete diagnosis, as in typhoid fever for instance, careful history taking and special symptoms in many diseases in children furnish evidence equally positive and equally diagnostic. The early and correct diagnosis can only be achieved by giving to the signs and symptoms elicited their relative values, dismissing those which are of general rather than particular import and studying carefully those which are known to have a more direct bearing or are significant of the disease under consideration.

Emsheimer rightly says that "early diagnosis depends not on the number of symptoms presented by the patient, but on the recognition of their relative significance. One definite sign is of far greater value than many uncertain ones and is often all that is necessary to make a proper and final diagnosis. Familiar though this simple rule may be it is certain that it is not always observed, with the result that differential diagnosis is rendered difficult." Naturally it would simplify matters greatly if in every instance there were present pathognomonic or even significant signs of the disease, but this unfortunately is not the case, but that they are often present and are either overlooked or disregarded is undeniable.

The classical description of a child suffering from intussusception is about as follows: A baby about two years of age, or perhaps a little older, is seized with spasmodic fits of crying, cramps, evidenced by doubling up, turns pale, vomits, passes blood in its stool, is constipated, and presents a sausage shaped tumor in the abdomen, and later presents a mass in the rectum; but the waiting for the case to become classical has too often resulted in death. One often sees a child who at the time of the examination is not screaming, is not blanched, and is comfortably asleep. There is no palpable mass in the abdomen nor in the rectum. The mother states clearly that the child was perfectly well before this illness, and that it began to have severe cramps and turned pale, and either passed blood with the stool or by rectum without the presence of any fecal matter.

Now this combination, in a healthy child, of a sudden onset of cramps with the passage of blood by rectum, is significant of intussusception and should not be disregarded. In an analysis of fifty cases of intussusception, in children treated at Lebanon Hospital, this definite set of symptoms was always obtained and where the diagnosis was made upon this basis and early operation resorted to, the reduction in mortality was almost incredible. Operation upon children suffering from intussusception for less than twenty-four hours is now practically without mortality. The percentage of deaths in series where the intussusception has lasted thirty-six hours or more runs as high as eighty-four.

In descriptions of intussusception too much stress has been laid upon evidences of the disease which occur late or not at all, but when the intussuscepted bowel becomes edematous, due to obstruction of the circulation, it bleeds, and this blood showing in the bowel movement or on the examining finger, is directly significant of the condition. This, in connection with the characteristic history of the case, should lead to a correct dagnosis even in the absence of all other physical signs.

Appendicitis is by far the commonest acute inflammatory condition in the abdomen in children. Early operation is now accepted everywhere as the correct procedure in acute appendicitis. This acceptance is based primarily upon the low death rate in early operation and the inability of the most skilled clinician to state with any degree of certainty the pathological condition. Therefore, the early diagnosis of acute appendicitis becomes imperative. It seems like going back many years to restate that the tenderness in the right lower quadrant in children is a sign of appendicitis, and so for the purpose of intensifying the impression, let us say that tenderness to point pressure in the right iliac fossa in a child is the significant sign of appendictis. When one sees a child acutely ill, suffering from abdominal pain accompanied by tenderness on pressure in the right iliac fossa, the diagnosis of appendicitis is directly indicated. I am aware that the child may have something else, such as inflamed retroperitoneal lymph nodes, pneumococcus peritonitis, ovarian cyst, or other local pathological changes, but the failure to recognize the great weight that should be attached to this local tenderness fills our hospitals with children in all stages of periappendiceal abscess formation. It is of the first importance to adopt a method for abdominal palpation in order to elicit tenderness if it is present. If the appendix is suspected, palpation should begin with the lightest possible pressure with the finger tips over the left lower quadrant, then the left upper, then the right upper, and finally the suspected right lower quadrant. Henry Roth has called attention to the fact that if the child's hands are laid along the sides of its body and there is local tenderness, the child will raise the right hand as soon as the tender area is reached.

Many of the usual accompanying signs and symptoms of appendicitis or of peritonitis may be absent; for example, we may not have the usual local rigidity, the vomiting, the high temperature, or the increase in white cells, but tenderness to point pressure over a diseased appendix is a definite sign of the disease and cannot be explained away.

The most difficult differential diagnosis in this connection lies between appendicitis and pneumonia. When there is general rigidity of the abdomen and as yet few râles in the chest, it is seemingly impossible at times to arrive at a satisfactory diagnosis. In a recent case a child of six was seized with a chill and three hours later complained of a slight pain in the abdomen followed immediately by general rigidity over the entire abdomen. When seen several hours later, respiration was 50, pulse 150, and temperature 104°, and the case had all the outward appearance of pneumonia with no early signs of pneumonia in the chest. Here the abdomen was so rigid and the muscular defense so perfect that local tenderness could not be elicited. The appendix was gangrenous and there was no general involvement of the peritoneum. In these cases, where differential diagnosis between pneumonia and appendicitis is difficult, we have sometimes been able to show that between inspiration and expiration in the patient suffering from pneumonia, the examining fingers may make deep pressure over the region of the appendix without eliciting evidences of pain.

Because acute osteomyelitis occurs in the metaphyses of the long bones where the growing bone is spongy, the bloodvessels large, and the infection closely confined, the destruction of tissue and the absorption of the bacterial toxins are often prompt and overwhelming. This process of destruction, the immediate somatic disturbances, and the frequent fatal outcome are so well known that a description of the pathology of this condition would be out of place here. Knowing this, it places upon us the burden of fixing upon a definite or significant sign for what one may safely call the most commonly misdiagnosed disease in children. The clinical symptoms of acute osteomyelitis usually given, the sudden onset, chill, high temperature, swollen and painful joint, the redness about the joint, are all equally present in the occasionally seen single joint involvement in acute articular rheumatism. If one depends only upon the foregoing description of the disease it is readily seen that the diagnosis of rheumatism will still be made in cases of acute osteomyelitis. The x ray, too, is useless here and it has been shown repeatedly that waiting for x ray findings to reveal the lesion in the bone marrow is fatuous.

A positive diagnosis may often be early established if, in conjunction with the clinical picture described above, there is present definite tenderness to point pressure along the course of the bone, above or below the joint in question. This has been present in some of our cases as early as six hours after the onset of the first symptoms, and has persisted in cases where children were brought into the hospital delirious, in whom the only local signs were very slight swelling, but who screamed each time pressure was made over the course of the bone above or below the joint. The especial importance of this sign, which is, of course, not new, is that it occurs long before the redness, and often before the swelling. Movement of the joint is often not painful in the early stages of acute osteomyelitis, even in the presence of swelling in the joint, but the presence of this painful spot will confirm an early diagnosis. We have commonly found Staphylococcus aureus in the blood, but in the favorable cases in which there was early diagnosis and immediate operation this has persisted for a short time and the blood cultures have then been returned negative.

Morris Richardson said many years ago that any one with a carpenter's gimlet, a jack knife and the courage of his convictions could cure any case of acute osteomyelitis. There are enough cases of early and complete operation with a favorable outcome to make us almost agree with him, and it may be put down as a certainty that with the courage of one's conviction, a larger percentage of patients suffering from this malady could be saved.

The object of this paper is not to encourage the discarding of all the other well known signs and symptoms of the diseases under consideration, nor to condone the failure to take full advantage of a most carefully taken history of the case, but rather to suggest that the signs most directly indicative of the diseases mentioned be given their fullest value.

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Medicolegal Aspect of Morbid Impulses*

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The problem of the determination of the degree of culpability of a person who has committed an antisocial act is sometimes associated with great difficulties. A variety of factors may enter into the solution of this problem. An illegal act may be committed accidentally or unexpectedly and independently of the person's will. It may be committed under an unavoidable necessity, such as in cases of protection of oneself or one's family. It may be committed under the influence of extreme passion or anger, when consciousness becomes blurred and cerebral inhibition is obliterated. It may be committed by insane persons whose delusional ideas, accompanied or not by hallucinatory images, develop morbid impulses of deliberate and well planned criminal tendencies. Finally, illegal acts may be committed by those who, though not insane in the strict sense of the word, are nevertheless different from normal persons by their power of reasoning, by their sentiments, tastes, sympathies, etc. To this class belong the large category of psychopathic individuals, also the mental defectives.

We will be concerned here exclusively with the medicolegal aspect of morbid impulses in psychopathic persons and in mental defectives with the object of determining the degree of their responsibility or irresponsibility. In such cases there is a genuine medicolegal problem to be solved, while lunacy by the nature of the profound mental disorder excludes all possibility of discussion. Let us consider the cause of the existence and the development of impulses in the first category of our group.

The study of morbid impulses is very important because of the grave consequences to which they may lead from social and medicolegal viewpoints. Such a study presents multiple interesting features. First of all, the underlying basis upon which these morbid states develop. Since Morel the question of heredity began to play the most important rôle in the domain of mental pathology. It finds its corroboration also in the study of Mendelian laws of heredity (1). Morbid impulses constitute episodic manifestations in the life of psychopathic individuals.

What is psychopathy? Under this term is understood a pathological state of an individual whose psychophysical resistance is constitutionally diminished; in other words, it is a condition which is a deviation from the normal type of humanity. In such a person there is an interruption of harmonious equilibrium existing between various functions of cerebrospinal centres; the cooperation and adaption of these centres are incomplete. There is an ataxia of thought, of sentiment, of will, of psychomotor functions.

According to the parts involved, these patients form several groups which are only apparently different from each other, but under which is hidden the same individuality, viz., the psychopath.

The most important characteristic features in psychopathic persons are found in their psychical sphere. The development of their intellectual faculties is irregular and there is a want of equilibrium in these faculties. Such patients are only partial, incomplete beings. They may have a remarkable memory but they cannot fix their attention. Their mental instability is sometimes extreme. At the same time they may be eccentric, dreamers, with romantic tendencies. They are emotional, timid, extremely sensitive, impressionable, suspicious, egotistical, haughty and may be affected with moral perversity of the gravest nature. The best illustration of the loss of psychical equilibrium is found in obsessions and morbid impulses. The latter is the consequence of the first.

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What is an obsession? Normally an idea, a sentence, an image may unexpectedly invade our mind and obstinately persist. It is sufficient, then, to exercise our will to a certain extent and make this phenomenon disappear. This, so to speak, physiological obsession, never leads to a morbid impulse. When a morbid obsession occurs, the cerebral centres are invaded by a certain image or idea, which remains fixed, and suppresses subsequently all antagonistic images or ideas. This is accomplished not without a struggle, but the tenacious idea is accompanied by a moral pain so intense that it subordinates the will, and the individual, perfectly conscious of what is going on, but powerless, finds himself irresistibly forced toward acts of which he himself disapproves. The obsession leads to an impulse, and these two phenomena are in the same relationship as a thought to the act.

On the basis of our conception of the unconscious world the phenomena under discussion finds an adequate explanation. The rôle of pathogenetic forces in the causation of psychoneurotic manifestations by the psychanalytic school is pretty well established. As the aim of this contribution is not the psychological aspect of the psychoneuroses but their sociological value, the analysis of the mental processes and of the conflict between the conscious and unconscious ideas which leads to the formation of obsessions and impulsive tendencies and other mental disorders characteristic of psychoneurosis, will be omitted.

The characteristic features of an obsession are therefore, A, lucidity as to the phenomenon; B, energetic struggle against the invaded thought, and C, moral torture. The elements of morbid impulses are: A, Sudden function of a centre or of a group of isolated centres without participation of reason or of the conscious ego; B, momentary impotence of the will controlling the act.

The state of consciousness, the apparent lucidity, are misleading for those who are not familiar with these disturbances and judiciary errors are readily explained.

In a psychopath who becomes fatigued, whose nervous system becomes exhausted, there may develop obsession and morbid impulses. Depressive emotion, prolonged intellectual effort, a prolonged waking state, excesses of any sort, abundant hemorrhages, protracted infectious diseases, disturbances of nutrition, intoxications, especially alcoholic, the sight of a capital punishment, the news of a suicide or homicide, the recital of a murder, are all provoking causes of morbid impulses in a psychopathic individual.

A young woman of thirty-five who was profoundly psychopathic, whose heredity was the most unfavorable (father syphilitic, mother alcoholic, a grandfather had paresis), had several miscarriages accompanied by tremendous losses of blood. Her recovery was of long duration. Soon there developed morbid impulses. Being a butcher's wife, she assisted him in carving meat in the shop. On several occasions while handling the large knife she felt a desire to cut off the customer's head. She realized her condition, she struggled with herself, resisting the torturing temptation. Finally once, in the presence of several customers, she began to scream; the knife fell out of her hands; trembling she begged them to remove the knife from her sight, as otherwise she would commit murder.

A young pharmacist, who has been under my care for the last two years, has frequently the almost irresistible desire to commit suicide. He is fully conscious of his condition, fights it often at the expense of his sleep. Once riding on a boat he felt the necessity of jumping overboard. Fearing for himself he begged the passengers to tie him to a post and keep him in this position until the boat landed.

Obsessions and irresistible impulses may affect also crimes of a less important order. In kleptomania there is an irresistible impulse to possess objects which are of no value. This is frequently done by those who are otherwise perfectly honorable, who possess sufficient means. Here, again, they are perfectly conscious of the criminality of the act, and of the consequences to which it may lead. They struggle against this tendency, they suffer morally, but they finally succumb to the irresistible impulse. Arson, assaults, rape, all varieties of sexual perversion, may be committed by a psychopathic individual under the influence of an obsession.

What is the outlook in obsessions with irresistible impulses? The evolution of these symptoms presents nothing typical. It may be periodical and intermittent. Sometimes it appears for a short period and disappears completely. In other cases it is slow, remains stationary for months and years. In still another series of cases the symptom disappears, but recurs from the least cause.

As Magnan has well said, "They are episode symptoms in the life of a degenerate. They are incorporated in the mental state of the individual, and never become separated from him. Appearing now and then during his life, they never undergo modifications; they are always the same."

In making a diagnosis in patients of this order it should always be borne in mind that while morbid impulses for minor offenses are frequent in the psychopathic individuals in general, the irresistible impulses for acts of graver nature, as homicide and suicide, are not frequent. They are met with often in true insanities in which the individual blows out his own brains or kills, seeks revenge, because he is under the influence of a delusion or is prompted by hallucinations of a terrifying nature. When a woman suffers from melancholia, she is mentally tortured by her delusion of the unpardonable sin, of her physical worthlessness, of deserving punishment for imaginary misdeeds. Voices are constantly reminding her of her wrong doings. Such a person will seek relief from continuous torture and finally commit suicide. Sometimes her delusive ideas will run in a somewhat different channel, and she will imagine that through her sins her relatives and neighbors, husband and children will undergo punishment and will suffer; in order to save them from inevitable suffering and torture she prefers killing them herself, and she acts accordingly.

In a paranoiac there develops in his diseased mind a grudge against certain individuals, who for an apparently logical reason are persecuting him or trying to prevent him from obtaining a certain important position which they themselves are after. He hears their voices through the wall at night; sees them masked in his room. Another paranoiac gets a mission from God to preach, to convert the sinful men, women, communities, nations. He gets messages from the Almighty through spirits, angels, who order him to accomplish his task and destroy any obstacle on his road. Such individuals will exhibit irresistible impulses commanded by their delusions and hallucinations and commit homicide. In paresis similar delusions may lead to identical consequences.

In dementia præcox when the youth commences to show signs of dementia, hallucinations and delusions develop: excesses and assaults of the gravest character are committed, he kills or commits suicide.

A senile dement forms delusions of being defrauded, robbed, believes himself being persecuted. Frequently erotic delusions make him plan ridiculous marriages, and if he is prevented from doing it, he assaults and kills. Assaults of senile dements on very young girls or children are not uncommon.

In toxic insanities, especially alcoholic, the delirious and confusional states are frequently accompanied by delusions and hallucinations; morbid impulses are then easily formed.

In epilepsy, after the motor manifestations are over, the patient remains in a confusional, delirious, or stuporous state during which irresistible impulses may develop and a crime may be committed. Sometimes the epileptic attack itself may consist of a sudden irresistible impulse for attacking, assaulting, and injuring.

In determining the nature of and the motives for morbid impulses only a prolonged and thorough examination will help the medicolegal expert to form an impartial opinion. Let us briefly emphasize the distinctive diagnostic points as they are essential for a proper conception of these interesting phenomena.

When a lunatic assassinates, he is under the control of a delusional conception and hallucination or illusion, by which he is carried away towards the abnormal impulse. The latter has a special character, viz., unconsciousness of the act; automatism is the essential feature.

When a morbid impulse is the result of an obsession in a psychopathic individual, the characteristic features of the act are: The lucidity of consciousness, the tormenting mental struggle before the act is accomplished, the realization of the horror of the act. At the same time the state of anxiety of the patient is accompanied by cardiac palpitation, acceleration of the pulse, headache, tremor, perspiration, etc. All these symptoms occur in an individual whose mentality is abnormal, irregular, asymmetrical and without equilibrium. In such a person also the soma will frequently be found deviated from normal; there will be present many stigmata of physical degeneration, disturbed functions of the viscera, of tissues, of organs. A profound study of his own life, of his reactions to external and internal stimuli, of his adaptability to surroundings, also of his family history, of the hereditary features—such a study is indispensable in making a diagnosis.

PSYCHIC FACTORS OF MENTAL DEFECTIVES.

Let us now consider briefly the psychic forces in mental defectives which may lead to obsessions or morbid impulsive acts.

In considering all varieties of mental deficiency we find a long scale beginning with mental monstrosities and ending with slight mental feebleness. When the intellectual powers are involved in their entirety we deal with idiocy. When the arrest of mental development is only incomplete and is, therefore, compatible with the existence of some intellectual manifestations, we deal with imbecility. There are also those in whom only certain powers are likely to reach a degree of development; in whom there is no general, but only partial defect of intellectual powers. For example, one will show a meager power of intellectual acquisition, in another the power of judgment is defective; another is incapable of acquiring elementary mathematical knowledge, or a knowledge of the natural sciences; in another the power of attention remains very elementary; others show a marked poverty in the power of reasoning, of generalizing, of abstracting, of memorizing, of associating ideas. This category of individuals manifests a conspicuous inequality of development of various intellectual powers.

From the viewpoint of mental responsibility before the law, it would be superfluous to dwell at length on the idiots. The complete absence of intelligence, of moral conceptions of sensibility, places an insurmountable obstacle between idiots and the exterior world. Education has no hold on them, impressions leave no trace in them. Instinct alone guides their actions and their relation to others. Their life is reduced to an automatic execution of vegetative function.

In imbecility we find rudiments of intellectual and moral development. The intellectual niveau is somewhat higher than in idiots which, therefore, permits certain acquisitions. With considerable amount of patience, perseverance and ingenuity one may succeed in training imbeciles in certain moral principles. In spite of all efforts one can expect but a certain degree of mental development in an imbecile. His language remains poor as to the number of words; his articulation is defective; his expression indicates poverty of thought, the character of his acts corresponds to his manner of thinking. In the sphere of morality he exhibits instinctive tendencies of a low order. Cruelty, vanity, gluttony, masturbation, sexual perversion, excesses of all kind, cowardice, unusual irritability are all characteristic of imbeciles, and these characteristics lead frequently to all sorts of abnormal acts. Theft, arson, brutality, homicide —are not uncommon in imbeciles.

Following up the intellectual niveau one step higher than in the imbecile, we enter the domain of the large group of mental feebleness, the study of which is of considerably higher importance from sociological and legal viewpoints than of that of idiocy and imbecility. Here we meet with a great many varieties and subvarieties and the transition of one into the other is imperceptible. This is the most important chapter in the study of mental deficiency, as the number of such individuals is legion. We find them with us frequently, we deal with them in innumerable transactions, we find them on school benches, as well as in business life. Their relation to the community frequently results in harm.

This group presents, speaking generally, a mentality inferior to the normal in quantity and quality. Their intellectual development is both delayed and reduced. The slowness of mental evolution and its lesser amplitude are characteristic. Thus, for example, the intelligence of a boy of twelve resembles that of a child of five.

In view of the enormous influence of intelligence upon the shaping of the normal personality, the resulting moral debility is to be expected in the category of persons which is the subject of the present study. It is a common observation that apart from idiocy and imbecility, one of the chief characteristics of the feebleminded is an obtuseness of conscience. The elements of the latter are too feeble in the struggle against passions. It may happen that the mentally deficient has some conception of right or wrong, he may feel that he does wrong, but he does not possess the aversion which would be characteristic of a normal person. The moral censors are not powerful enough, the voice of duty is not loud enough to be overcome by impulse. The cause of this disorder lies in the incomplete development of moral ideas. The want of judgment, of will, the weakness of character render the moral personality of the feebleminded unstable, not resistant and thus they become an easy prey of their passions.

The majority of the symptoms referable to the deviations in the moral sphere gravitate around the ego of the mentally deficient. Thus the ego becomes extravagantly accentuated. Egotism consequently is one of the most conspicuous symptoms of the entire picture. The mentally deficient individuals have no other thoughts but of themselves. Nothing moves them, nothing disturbs them except their own disturbances which they immeasurably amplify. Such a psychic orientation naturally leads to a dominating attitude and intolerance. Envy or jealousy is another derivation of egotism.

Jealousy creates defiance and doubt; anger and hatred are the next consequence of jealousy. The mentally deficient may develop a hatred towards the dearest and the nearest. As egotism is the predominating characteristic, there is absence of altruistic sentiments.

Among other typical features of mentally deficient individuals may be mentioned impulsive phenomena. They are spontaneous and involuntary psychic manifestations. Normally our acts are controlled by two factors—desire or an impulse for action on one hand and reasoning on the other. The latter controls and inhibits the former. When the intellect is impaired or defective, the impulse predominates and the desired act is executed no matter how deleterious it may be; in such cases we observe frequently sudden impulsive acts in which neither reasoning nor will power intervene. In some cases the mentally deficient may yet at first attempt to reflect upon his premeditated act, he may yet appreciate the immorality and criminality of an illegal act, but the appreciation and meditation are not profound enough to overcome the instinctive tendency and the person succumbs to the latter. Morbid impulses may be manifest not only in criminal acts of a gross nature, but also in minor acts. The tendency to excesses is commonly observed in these cases.

On the preceding pages the essential features of mental deficiency have been briefly depicted. We have seen that the two important elements of the personality, namely, the intellectual and emotional, do no more preserve the parallelism of the normal individual. The intelligence being feeble it has no more inhibiting power over the moral personality. Struggle against passions does not exist or exists in a small degree. Impulsive acts are characteristic. The mentally deficient possess either an emotivity with exaltation in which great impulsiveness, sudden anger, extreme anger, violence and brutality are conspicuous, or else emotivity with depression in which they exhibit extreme timidity, extreme shyness or a tendency to solitude so that the resemblance to the attitude of a savage is in some cases striking. In some cases these two conditions may alternate. It is evident that the impulsive acts of the mentally deficient individuals are the expression of lack of control of ideas over passions. As the cerebral centres are the source of ideas and of their associations, we observe them here in a state of collapse; they appear to be withdrawn from the chain of genesis of ideas and of their manner of manifestations. Even the human principles of the French Revolution were unable to eradicate from the minds of the legislators the deep seated ideas of moral responsibility.

With the advent of Pinel and his school a new era entered the field. With him the old ideas suffered a decided blow. He succeeded in convincing human minds that insanity was a disease and that there was no crime if the criminal was insane while committing it. Gradually the field of responsibility became wider and wider. The criminologists of the new anthropological school, and with them the psychiatrist and all students of normal and abnormal psychology, jurists and enlightened laymen, all admit now that a psychopath, as defined above. presenting episodic paroxysms of pathological impulses cannot be considered fully responsible for his criminal tendencies and acts, and that instead of being committed to prison, he should be removed from society and placed safely to undergo medical treatment.

As to mental deficiency we have seen on the foregoing pages that besides a certain degree of intellectual inferiority, there is particularly an inherent deficiency of inhibitory power. We have seen the whole life of mental defectives is composed of incidents of an instinctive nature, as the instinct predominates in them, and, therefore, their actions are invariably the result of mental activities. The impulses are no more under control of the cerebral centres which ordinarily regulate our actions; but they exercise their influence on the motor sphere by producing an excessive activity. In such cases naturally there can be no choice of action, each movement is the immediate result of sentiment. The acts are unconscious, they must be executed because they are out of the field of struggle which normally exists between reasoning and passion. The acts are, therefore, mechanical, automatic, and of a reflex nature.

MEDICOLEGAL CONSIDERATIONS.

The question of responsibility of persons presenting morbid impulses is of the greatest moment from a social and medicolegal point of view. It is frequently accompanied by difficulties, and has led not infrequently to many judiciary errors.

Primitive society recognized crime as a punishable act, irrespective of any other consideration. The criminal was always punished, no matter what his mental state was. Ancient legislation ignores entirely the question of irresponsibility. The Romans were the first who distinguished between *compos* and *non compos mentis*. But the great difficulty was to determine under what condition an individual ceases to be *compos mentis*. Prejudices, errors of all sorts, religious and political passions, interfere with the proper understanding of cerebral functions, of impulses. These persons may be fully aware of the illegality of a certain act, they may fully realize that murder, assault, arson, deception, which they commit, are morally wrong and punishable by law and yet they cannot by reason of the very nature of their mental inferiority be held totally accountable for their actions.

The medicolegal literature is abundant with examples of indiscriminate conviction of this category of persons. Notwithstanding the considerable work of the psychiatrist; and the incessant labor of the profound students of psychology and of the evident and flagrant injustice to mankind, some jurists are loath to accept the humane and scientific principles laid down by the workers in this field of human knowledge. It is, of course, proper to advise, as they do, to moderate the passions and to learn to control them, but this is possible only for a brain free from any hereditary or acquired taint. It is just as difficult to control and direct the operation of a brain whose anatomical and functional integrity is affected as it is to hold oneself straight with a spinal column which is scoliosed or otherwise deviated.

The degenerates with morbid impulses are, therefore, irresponsible; but what is the degree of their responsibility between the acts, viz., during the lucid intervals? Here jurists, alienists, anthropologists are not exactly of the same opinion.

The old classical school of criminology believes in socalled partial responsibility. They say that because an abnormal brain, although not insane, has an abnormal will, an abnormal conception of right and wrong, the law should impose only partial punishment. The modern psychiatric views, the glory of which belongs mostly to the French school and especially to Magnan and his pupils, are based upon a different conception of degeneracy and criminology. Lombroso, Ferri, Garofalo, in Italy; Broca, Manouvrier, Lacassagne, in France, have laid the foundation for the modern anthropological school. According to the anthropologists the criminal is under two kinds of influences: intrinsic or individual and extrinsic or social. This double responsibility in a psychopathic individual is nil, and his responsibilty is absolute at all periods of his life; its excuse lies in the heredity and in the morbid impulses which are not present in normal beings.

When an expert is called upon to give his scientific opinion on crime committed under the influence of an irresistible impulse, he has to consider not only the crime, but also and mainly the criminal. As to the criminal, it must be determined whether he is insane or only a psychopathic or mentally defective individual affected with obsessions and morbid impulses. In both cases a thorough and careful examination is absolutely necessary.

When the crime is committed without a motive, while it is accompanied by a perfect integrity of conscience, and preceded by a mental struggle, there is no doubt that it was the result of a morbid obsession. In insanity the expert will sometimes encounter difficulties. In the first stages of a mental affection, in which a perverted mode of thinking, feeling, and acting is not easily recognizable; in epilepsy, when between the attacks the individual is comparatively lucid; in some cases of paranoia, when the patient will skilfully conceal the subject of his delusion—in such cases the expert will have to surround himself with all possible precautions, obtain detailed personal and family histories, interrogate the criminal at various times before he decides the question of insanity, viz., responsibility. The rôle of the expert in these conditions must consist not only of giving a personal impression more or less justified by his own experience, but also of presenting evidence which will be understood by laymen.

The determination of the degree of responsibility of a criminal should therefore be placed in the hands of an alienist. Only he is capable to determine early stages of insanity, only he is able to determine apart from insanity the degree of mental control, of inhibitory power of a delinquent who presents mental stigmata of degeneracy.

There is a frequent conflict between medical and legal conceptions of insanity. The law admits that a man with one fixed delusion may be sane on every subject except when he touches upon the delusive thought, and some jurists consequently argue that he can be considered sane before or after a crime is committed, but insane during the act. From a medical viewpoint such an argument is unscientific, for if delusive ideas are apt to originate in a brain, the function of its constituent elements is certainly disturbed. In such a brain one certain delusion may be formed and remain fixed, but by the very reason of this fact this brain must be considered diseased, and misconceptions with misinterpretations may become manifested at any moment. A person thus affected should by no means be considered "responsible before the law" before or after the crime.

When an individual's conscience is not completely developed, when judgment and will power are wanting; when egotism is pathological; when envy and hatred are intense and directed towards the dearest and nearest; when impulsive tendencies are conspicuous; when a thorough appreciation of acts and meditation are intrinsically not profound enough to overcome instinctive tendencies; when all these phenomena characterize mentally deficient persons, phenomena which constitute an integral part of their abnormal makeup—the problem of mental responsibility may be solved without special difficulty. It requires no special stretch of imagination to see that those mentally inferior such as depicted above possess inferior and defective conceptions of right and wrong. The discrimination between the two is naturally faulty. They may recognze the illegality of an act, viz., that punishment by law may follow, but the fundamental and social value of a lawless act is not altogether accessible to their abnormal or defective intellectual and normal personality. It is therefore evident that their responsibility can by no means be total; it must be limited. The established legal test of right and wrong cannot be applied to these cases.

Those who create laws and those who administer justice view with very few exceptions only the social side of the law and usually are not at all interested in psychological and medical studies which present a different concept of criminality and of the criminal himself. It is true that penal legislation and legal medicine are distinct and separate sciences, but positive criminology must rely on both branches of human knowledge.. An intimate unity of these two sciences is an indispensable and an essential condition of progress. Criminology has for its object the formation of positive laws concerning crimes and the discovery of remedies for them. With this object in view it searches the truth wherever it can be found and takes from medical and legal sciences data which it needs to form a scientific foundation. By the union of the two sciences the old and too narrow boundaries of human conceptions of liberty and responsibility will be broken and progress will be assured. Our present knowledge of normal and pathological processes in the psychic sphere, the proper appreciation of abnormal mental operations enable us to avoid errors in administering justice. In studying a crime we must distinguish the conditions in which it was committed and the psychic characteristics of the author of the crime.

I will conclude with the following propositions:

The legal conception of responsibility is not in accordance with the principles of science, and does not satisfy the practical exigencies of life. An alienist should be called upon to examine such a criminal. Administration of justice in such cases should be confided to a jurist and to an alienist.

Administration of houses of correction should be placed in the hands of alienists and pedagogues.

Youthful criminals should be placed, not in prisons, but in special institutions where they shall receive medical attention.

Conviction of criminals intellectually and morally defective is unjust and should be replaced by prophylactic measures which form a part of social hygiene.

REFERENCES.

1. CANNON and ROSANOFF: *Journal of Nervous and Mental Disease,* 1911, p. 272.
2. ROSANOFF and ORR: *American Journal of Insanity,* v. lxxviii, p. 222.

Modern Commentaries on Hippocrates*

The Humoral Theory and Its Relation to Others

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It has seemed expedient in the more recent papers, contributed by me to this journal, to follow ancient medicine in its relation to the humoral theory into the era of Galen. This led to a perception of the advantage to be derived in an exposé of the ancient humoral theory, from a study of the times and the personality of Galen. Both, I believe, had a profound influence in the shaping of the doctrines of future ages. But these things having been accomplished, not in the best manner perhaps, but in one as good as possible for the writer, it is with pleasure he returns to the Hippocratic Corpus again. Excellent as some of the essays, evidently from hands other than those of Hippocrates II, are, we are prone, doubtless too prone in our idealization of the Father of Medicine to adjudge to him those books, which in excellence stand out as preeminent. Now these books, which we fondly believe came from the mind of the Master, show a lack of reverence for the humoral theory or any other theory, which appeals almost as much to the heart as to the mind of the modern reader. It is chiefly in the books, commonly regarded as spurious, that we perceive a heralding of that era of crystallization and stagnation which received its last touches from the industrious and aggressive hand of Claudius Galen. With this general statement I shall not in this essay take great pains to remind the reader of the doubts of authenticity in referring to any specific treatise of the Corpus, but I shall leave that thorny and, as I think, insoluble sort of problem to abler palæographers and lexicographers.

In the last Commentary on Hippocrates (July 20, 1921) before my excursion into Galenic Medicine, his times and the manner of man Galen was, I tried to show the application of the humoral theory in the books of the Hippocratic Corpus to practice. It was indeed not difficult to select passages showing its association with other theories and its adaptation to correct as well as to erroneous clinical observations. It was difficult, however, to find its intimate association with the régime and the pharmacal treatment of disease and I fear I shall be no more successful in continuing the attempt now. The pragmatic philosophy which has been an outgrowth of the materialism of the nineteenth century and is as a matter of fact no philosophy at all, in the usual meaning given to the term, has this very valuable though not very original canon. A doctrine in its ultimate analysis must be subjected to the practical test of its adaptation to facts. Does it work? I fancy in this we find the reason it is so difficult for the modern reader to understand the actual application of the humoral theory in the works of Hippocrates, or Galen either. It does not work and it never did work, but it resulted in a distortion of facts and still worse in a most lamentable distortion of the medical mind for more than a thousand years. I may hope, however, to show its relation to various methods of thought, to ideas of etiology and semeiology, such as coction and crises, crasis and the pneuma. In the last instance, the subject matter of much of my previous discourse, its association has been frequently alluded to. It will perhaps be interesting to see in writers much more recent than Hippocrates or Galen these theories dominating more ancient thought; working side by side, in the study of the theory of medicine, if not so clearly perceptible in its practice. Here I am still engaged in an attempt to portray the working especially of the humoral theory chiefly in the books of Hippocrates.

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*I have chiefly used the text and the French translation of the works of Hippocrates by Littré.

At the dawn of medicine, as it has been revealed to us in written records, it was a firmly rooted idea that the odd and the even day, dating from the inception of the disease, bore an important relation to its subsequent manifestations. This seems as a matter of fact much older than the humoral theory itself, one of the shreds indeed out of which it was manufactured. It was doubtless one of the tenets of the Pythagoreans as to disease, but that specifically is no more apparent than their general influence in the building of the humoral theory itself to which they contributed the cognate ideas as to number. This seems to be the opinion both of Renouard and of Littré and all that archæology has told us since their time goes to confirm it. The juxtaposition of the numbers 1 and 2 in the whole number 12 had in itself a significance, if we are too accept the interpretation of the Golden Verses of Pythagoras by Olivet. The number 12 results from the multiplication of the next two in the series, 3 and 4. The Pythagorean supposed there were three worlds or three primary divisions in the universe, each made up of four parts. We see in this an affiliation with the four elements and the four qualities. The mystery of the Trinity in our Christian exegetics is no more a mystery than this and doubtless has with it historical affiliation. At any rate, the figure 12 and our division of time—our dozen sprang from the same mystification—became a mystic symbol for the divisions of the universe. "In this system the number four represents every substance endowed with its own attributes, distinct from other beings, whether God or man, plant or mineral; from this the Aesclepiads, heirs of the science and the tongue of Egypt," full of these symbols, attached the number to the qualities and the humors of disease. In the remark of Aristotle, incidental to his discussion in the *Politics* of the monarchical principle in the government of Egypt, we get a hint of the figure four, as we now have a chance abundantly to observe in the prescriptions of the Kahun and Ebers Papyri: "In Egypt," Aristotle says, "the physician was allowed to alter the mode of cure which the law prescribed for him, after the *fourth* day, but if he did it sooner it was at his peril." (III-xv.)

We need, however, further enlightenment on the question why the odd and even day so early assumed such an importance in medicine. As will subsequently appear in the course of this discussion, it seems extremely probable that this importance was at least accentuated by the phenomena exhibited by the tertian fevers. In the Pythagorean philosophy we see that hints may also be found of an origin entirely independent of the phenomena of disease. We may judge from a remark of Celsus that he also believed the *ancient* physicians were led astray by the Pythagorean reverence for numbers[1] but he finds no theory detailed in Hippocrates explanatory of his observations as to number. The author of the *IV Maladies,* however, gave an explanation which he thought, doubtless, reasonable enough. He supposes it takes about three days for the effect of the humor, good or bad, to become manifest after it has entered the body. We must remember that the humor was something extraneous as well as internal in its origin, but mingled with other things. Introduced with the food it was separated and went to the liver, spleen, the head, the heart, by virtue of their special power of attraction for that particular humor with which their activities were concerned. If too little or too much arrived the organ suffered derangement, except in the case of the heart. The heart having thick muscular walls did not suffer from such disturbances. A superabundance of either of the four is rectified by defecation, urination, expectoration, hemorrhage from nose or anus.

"Now I am going to tell how and by what influences the health is preserved. When one has eaten and drunk and the humor penetrates the body, mingling with the humor already there, in the manner I have said, having come from outside the body, it is established in the body the day it arrives. But tomorrow another humor comes (he has in mind the usual custom of one meal a day). This makes two days and two humors. One of the humors has two days' duration, the other one. The latter stays in the body being thick; the former being matured by the heat is diffusable and being light on the morrow reaches the belly, continually pursued by the fresh humor." The Greek word, used for the process we identify with digestion, which in Latin is translated as "coction," has a primary signification of "to soften, to ripen, to mature." It should be said that some of the ancients, among them Empedocles, visualized the digestive process as one of putrefaction, but the idea of coction prevailed, chiefly probably through the influence of or the necessity the humoral theory had for something which does not seem so final as putrefaction. This was an instinct in the right direction of course, but how curious when applied to the processes of disease as we understand them! We should instinctively prefer putrefaction as more significant of external bacterial origin. They clung to the idea of an upset of the equilibrium of an internal physiological process. If this is not wholly accurate in an interpretation of ancient thought, it is at least suggestive of a vast difference in their scientific environment in medicine and our own, and it brings out the alliance of the humoral theory with the ancient theories of digestion. It should be further remarked that in the Hippocratic books we get not only a trace of the lack of differentiation in thought between the different parts of the gastrointestinal canal, but the anatomy of the abdominal cavity in their discourse is also confused. Where the modern physician would say stomach, duodenum, colon, etc., the Greek is apt to say belly, the equivalent of the rô-ab of the Papyrus Ebers, when he really means in his now dawning differentiation definitely stomach. This leads the modern reader, with no such vague anatomical ideas, often quite astray. He is inclined to give a definiteness of translation to certain words, still undefined, which did not exist in any such exactly outlined conception in the mind of Hippocrates. "Stomach," then has its definiteness for us only when we are able to identify it by its modern conventional function.

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[1] Verum in his quidem antiquos tunc celebres admodum pythagorici numeri fefellerunt. *De Medicina,* III. 4.

"Arriving at the stomach it (the fresh humor) digests the food there and makes the blood of the body out of it. Its sojourn makes it foul. Upon the third day it departs with the excrement and the urine in quantity entirely equal (proportionate?) to itself, similar and corresponding and although this is only a part of it, the humor nevertheless remains in the body in accordance with the above account. Then the third day still, there runs into the belly from the body a portion of the humor, more abundant and more foul, that which had remained; it carries the digested food and that which is abnormal in the body (diseased?) and departs with the rest." I translate this from Littre's rendering of the text into French and comparing the latter with the text I see little to amend and cling as closely as I can to the literal rendering of the French into English, though despite all the allowances I have alluded to above it seems irrational, but evidently it satisfied the original author who remarks, after tracing out the physiology of the urine quite as obscurely: "Thus I have explained how and why men keep well." We cannot help believing the ancient mind like the modern mind was often complacent when facing a confusion its theories had made it too blunt to perceive. Molière mocked at such mental hebetude. Clouded by the persistent mists of theory it is the universal human mind, deeper down than any varnish of learning, which feels the benumbing effect of its prepossessions, no less than the limitations of its ignorance.

"At once after the expulsion of the faeces and urine a new supply of food and drink arrives in proportion to the dejections." Previously he had used a simile of three cauldrons or reservoirs—the fluid running out of one into the others through connecting pipes, when the fluids in the other two are drawn upon. Supposing, therefore, one meal a day the matter injected on the first day is expelled on the third. This, in ignorance of the fact that man, not God, divided time and invented numbers, seems to be the course of the thought which is busy with the problem of the cause of disease in its relation to the preservation of health rather than with the latter primarily and independently. A vicious method is combined with defective material in the formation of a structure for housing physiological and pathogenic processes together, a scheme which in itself has still to be rounded out before we approach any finality in the conception of disease or health either. Any transgression of this régime, as thus conceived for the humors, causes an engorgement or a collapse of the veins. It is not only a question of the condition and the amount of the entering humor, but of the time at which it enters. The first day and the third day stand then on a physiological basis and so it continues into the pathological process set up by too much or too little or the wrong kind of invading humor and so it is also that "on the odd days people recover and on the odd days they die." . . . "The humor departs on the third day or some subsequent odd day being driven out by some good humor following it or for lack of nourishment of the disease in having consumed all healthy parts the patient is also exhausted."

Even wounds follow along this track. The inflammation "declines the fifth day or rather, following the size of the wound, on the third, the fifth, the seventh, the ninth, the eleventh," an idea entirely devoid of any support in observation at all. Now here enters one of the hints we get that the precession of the chill in malarial fever uninfluenced by quinine, especially in its more common types, caused a modification in the gentle flowing course of this sort of exposition. Why not the thirteenth? Even surgical fever had to be modified in its description to conform with general principles, I suppose, here as well as at other seven-day periods. "A first period having elapsed the third day (from it), which is the fourteenth, counting from the first before the beginning of a second period, it is on the fourteenth day that the inflammation of large wounds declines." Something had to be done in malarial fever reckoning finally to get the odd and even into working order or the chills would sometimes be found changing over to an even day, and as surgical fever and other continued fevers kept up every day, rain or shine, the chills, if there were any, had to be ignored and the imagination tortured into a compliance with the ever present example of the common type of malaria. Perhaps I am letting my own imagination run away with me, but that is the way I struggle to get out of a mire of ancient chaos, as it seems to the modern mind, in which the ancient mind must have had struggles of its own. The disorder introduced into every day life by the precession of the equinoxes had to be rectified by Caesar, then by Gregory, and we are still compelled to be wary of it. The cosmic refusal to submit to man's arrangements had its counterpart in the refusal of disease phenomena to fall into the lines arranged for them by the humoral theory. Time is man's invention, not God's.

"There are three principles whence maladies arise: I have explained one of them (plethora)—for want of evacuation a man falls sick. The second is the changes of the weather. The third is external violence, including also fatigue and other things of this kind." The general sense of this, falling under three etiological headings is:

1. Plethora—from errors of diet and regimen. 2. Weather, primarily or secondarily to these and other causes. 3. Violence, fatigue, and other things.

This last is the most interesting to us because under it we are able, as much as anything from its vague comprehensiveness, to include many of the factors in the processes of infection in its broadest sense. The exciting and the predisposing causes we see undifferentiated, but with it all we are able to perceive a fairly extended grasp of the real causes of disease, in spite of the falsest of theories.

The demand, therefore, is a quite natural one when it is asked: Where does the humoral theory come in? It is not easy to get at the bottom of this conception, because the author himself, and in many other treatises other authors, are busy repeating or accepting the view that the humors are the causes of health and disease. A little reflection convinces one that this is an instance where the use of language falters in exposing the meaning because there is no meaning. I think we can best furnish an entrance to it here by the abolition of the common conception of cause altogether. At bottom it has no business in scientific language anyhow, in medicine or any other field where careful thinking is necessary. There is a finality hangs about the word with which science has nothing to do. Disease and its causes must be visualized as a process, whose termination is death or health but whose beginning we cannot hope to reach. We must break in on the process somewhere arbitrarily. Since we have ended it somewhat arbitrarily at health or death, there being processes that go on too both before the one and after the other, we might choose birth as the beginning, but we are keenly alive to the fact that the processes of disease now in our ken long antedate the birth of the patient. However, we have pursued this train of thought far enough to allow us to realize that the category of causes given above is only a cross section, or sections at different levels, of a process which is too tangled and complex to make the comparison to a chain with links entirely satisfactory, but it does give us a glimmer of reason.

In the author's reflections on the causes of leucorrhea we find it ascribed to the phlegmatic temperament of the woman and to the bile in movement without having been evacuated, but despite this, as Hippocrates said in the *Ancient Medicine* would be the case, we find him giving not something to warm the cold phelgmatic temperament or a chologogue to purge her, but the recommendation of poppy seed, classified, later at least, as cold in nature and in physiological action. Now let us see how he knew the menstruating woman was cold and phlegmatic and so perhaps we can understand why treatment continued guided by experience rather than by theory for the most part. "If you wish to purge a woman who cannot have a child, look if she be bilious or phlegmatic. You will recognize which of the two tendencies prevail by this; throw some sand out into the sun, pour on it the menstrual blood and let it dry; if she is bilious, the blood will be yellow on the sand; if she be phlegmatic, it will exhibit a sort of a mucosity. This being ascertained, you can evacuate by the bowels the humor which predominates," that is, use purgatives known to bring out either the bile or the mucus, as the case demands. The yellowness of sputum when it occurred was the indication of bile being in superabundance. These being the bases upon which therapy consonant with theory had to be built, it is not surprising if the results were sometimes at variance with expectations and the most enthusiastic humoralist forgot his principles when he came to practice, but had other troubles.

In the *Nature of Woman*, by the same author as the *IV Maladies* from which I have so extensively quoted, whether the cervix uteri is soft and moist or hard, you must apply a counter irritant, which hardens by its mordant and inflammatory action in the first condition and in the scirrhous cases it brings out the humor and then you can apply emollients. If a woman is phlegmatic rub up a little daphnia tartonraira, if bilious let her have daphnia laureola, though what makes one an antiphlegmatic and the other a chologogue may still be patent in modern pharmacy, but it lies outside of current knowledge today. We may remark, by the way, the descriptions by this author of uterine measures carry us back to the Kahun Papyrus and the land of Egypt. The method of telling if a woman is fruitful or not, a thing of much concern in the Orient and of much prurient curiosity in Europe of the Middle Ages, the exposure of pharmaceutical preparations to the dew of the night, the frequency of the use of the poppy, the stercotherapy, all point to gynecology on the banks of the Nile, but we find in this ancient derivation no explicit suggestion of the humoral theory, one reason perhaps why von Oefele derives its Greek development from Asia, but the evidence seems to me to point to its development, as we know it in Hippocratic medicine, in the historical period in Greece itself. The critical days and the chronology of disease we have traced as well as we could, though somewhat conjecturally, through the Pythagoreans to Egypt and the East, but it seems clear that some localized phenomena are responsible for the way the theory bloomed afterwards in the medicine of the Mediterranean shores.

It is possibly significant of an origin earlier than that of the efflorescence of the humoral theory itself that we have to turn to the genuine and for the most part to the older books of the Hippocratic Corpus for a more complete and a clearer exposition of the ideas in regard to the critical days and the periods through which the fevers and other affections passed. What a half tertian fever is I do not know, but in the *1st Epidemics* we are introduced to some sort of an intermittent fever as distinguished from our conception of the quotidian, the hectic and the typhoid, and we are at once put on the track of the periodicity of malarial fevers as responsible for much of the classification of odd and even, though, especially as to this, the intrusion of lobar pneumonia with its striking recovery by crisis, and typhoid less obviously, but observable, as terminating by lysis, were phenomena so frequently forced on the attention that they too must have lain at the back of medical thought in the basin of the Mediterranean when the humoral theory was building. Immediately in sequence to the mention of the semitertian, which we associate by the name alone with malarial fever and may not have been malaria at all, we find the discourse drifting off into something fairly well descriptive of pneumonia—"such was the course of these phthisislike cases."

Modern critics have at times asserted that Hippocrates had to do in his day with types of disease unknown to us. We shall see that very likely something of this is true, but it is well to keep these opening paragraphs of *1st Epidemics* especially in mind as throwing a flood of light upon a congeries of cases, for us in entirely remote categories, standing as we do on an etiological basis, but existing in the mind of Hippocrates grouped on a basis of symptomatology. So far as there was any grouping it is misleading for modern readers. Why should not the ancient observer be struck by the similarity in the sudden defervescence in some cases of pneumonia with the abrupt termination of a malarial paroxysm within a few hours? That the latter was likely to recur and the former likely to proceed steadily, but more slowly, to recovery did not throw them entirely apart, did not entirely destroy the illusion of their kinship. This I instance as much to serve as an example of something else—as a reminder that the bacillus pneumoniæ, if it is a bacillus, and the plasmodium malariæ, do have a similarity in their pathogenic manifestations which does not occur to us, intent on other interests. It is an example of the strange picture of disease given by Hippocrates when he summarizes, while objectively his narration of individual cases is far less confusing to us because we can then do our own grouping.

Entirely at random I open the third volume of Littré's *Hippocrates* at the page recording the case of the seventh patient in the *IIIrd Epidemics,* second section of the first constitution, as Littré arranges things, the woman who dwelt with Ariston. She had an angina, a hard swelling about the neck, fluid returned from the nose when swallowing was attempted. Now this may have been a Ludwig's angina or it may have been diphtheria—that is, Ludwig's angina may then have been of more frequent occurrence, or malignant diphtheria accompanied by extralaryngeal swelling may often have been seen. We now rarely or never see Ludwig's angina in a woman. All these variations in disease types from our own may have been real or they may have been verbal only. How much swelling? We do not know. It was some profound toxemia with a throat lesion. The fifth day she died. The young man who dwelt in the Place of the Liars, the eighth patient, died on the seventh day, but with no throat trouble at all. Typhoid in the history can hardly be mistaken, though the fatality of it, "dying on the seventh day"—"an acute case," is striking. We know why in some of the fevers in our category of typhoid the patients die as early as the seventh day, others go on to the fortieth, even some to the eightieth day. Some naturally too, most of them in fact, do not strictly get well precisely on the twentieth, the fortieth or the eightieth day, but if we had our gaze glued constantly to the marvel of numbers, the marvels of mathematical science, the mysteries that Pythagoras brought from the East, as assiduously as we have them glued on the marvels of the microscope, the mystery of radium, the fascination of the clouds that float in the test tube, I am quite sure that our minds would have fallen as theirs did, prostrate before their fetiches, the astounding revelations of the multiplication tables and the queer coincidences of angles, the singular adaptation of cubes and spheres to spaces calculated from them.

We are still busy with space and time, not altogether satisfactorily to the ordinary human mind after three or four thousand years of training, but how in its infancy the mind must have marvelled, how deeply it must have been impressed, how absorbed in the possibility of arranging all things into multiples—units of time and space—and we suspect such units are mere artificialities, artefacts to help the engineering of life. They were realities, not mere figments, for Hippocrates, badly understood and their marvels greater than even microorganisms were for us a generation ago. As we read, however, all does not fit into the typhoid category or the malarial categories. The remittent and the typhoid and the malarial and the typhomalarial fevers were a sad mess for our grandfathers who knew nought of bacteria, but even their puzzles bore a different aspect for Hippocratic practitioners who knew nought of quinine. We know nothing of malarial fever whose course is undisturbed by quinine and many of the puzzles in the *Epidemics,* not all of them of course, would be easier for us if we were familiar with the works of the plasmodium unassaulted by the alkaloids of cinchona. In the first *Epidemics* we do see that the "phthisoids" with cough and sputum for the most part died and the other fevers were less severe, but the chronology was what absorbed Hippocrates. These crises, the odd and the even, we see rested on a basis of facts—the discontinuity of malaria—always in existence and on a basis of a cosmical theory of numbers beginning before history and bringing us in our day only to the realization that the gods in their day were joking with the Greeks when they opened out to them prospects of becoming acquainted with Time and his twin, Space.

"In the autumn and during the winter, continued fevers, day time fevers, night fevers, semitertians, genuine tertians, quartans, indefinite fevers, each one affecting many people, prevailed," the tertian the most of all, mild malaria late in the autumn and in the winter. It is not entirely incomprehensible, this confusion of words of which Lucretius complained and of ideas which are so foreign to us, and here and there in the chaos we find concrete things shining forth to us quite plainly. The delirium and the coma and the burning high temperature, the phrenitis, the lethargus, the causus, have for us a well understood pathological basis. The night fevers, the indefinite fevers, we group with the hectic, the septic, the chronic malarial and we know they are apt "to last a very long time" and to have many relapses, many ups and downs, in the absence of proper treatment especially. We know what the hemorrhages, whether from the nose or the bowel, mean and we know what the paralyses following sore throat mean, but their frequency and the hemiplegic character of many of the cases, in the "third constitution" leave us in a helpless state. Whoever heard of an epidemic of apoplexy? Some new disease may after all have lurked in the epidemic at Thasos, but taken together in the mass, except for prosaic unimaginative minds, the picture drawn by Hippocrates in these *I and III Epidemics* is a vivid and striking and realistic one. In the infancy of differentiation, more than two thousand years before Rokitansky and Virchow and Pasteur, it is indeed a panorama sketched for us by a master hand.

Editorial Articles

PRESENT STATE OF RADIOTHERAPY OF CANCER.

The indications for radiotherapy in cancer, whether to effect a cure or amelioration, or to be combined with surgical treatment, is a subject of importance at the present time. Great progress has been made in the use of penetrating rays which may be regarded as true elective poisons of the chromatin of the cell nucleus. The rays act more especially upon the cells undergoing reproduction, a fact which explains their power over neoplastic cells which are endowed with an intenser reproduction than the cells of the normal adjacent structures. Each neoplasm has its special radiosensibility.

Radium therapy is also a newly acquired means of treatment of malignant disease, by direct introduction of radium into the tumor mass. There is a procedure which gives excellent results but requires special technical knowledge on the part of the operator, namely, radium puncture, the transfixion in various parts of the neoplasm with needles containing radium or emanations of radium. Before any treatment is undertaken, it is absolutely essential to make a biopsy of the growth on account of the variable radiosensibility of the various types of neoplasms. In the great majority of cases treatment will bring about an amelioration, such as cicatrization of the ulcer, retrogression of the tumor, attenuation or cessation of the pain, and occasionally a veritable cure, and sometimes also an aggravation of the process.

There are in fact contraindications to radiotherapy in cancer. There are the cancers refractory to the rays—branchiomata and melanotis sarcomata, likewise the socalled acute cancerous processes. The treatment is dangerous when deep local infections, especially pelvic, exist, and then one should also be fearful of perforation of a hollow viscus, the seat of malignant growth, the risk of bone necrosis following the use of the rays, cachexia and visceral metastases.

If the neoplasm is operable it is impossible, in the present state of our knowledge, to tell whether it should be dealt with by radiotherapy or surgically treated. In some cases, however, the indications for the use of the rays is clear, such as basocell epitheliomata of the skin and mucosa, while sarcomata and lymphosarcomata possess radiosensibility in a very high degree. In other cases, on the contrary, radiotherapy is clearly contraindicated. These cases are spindle cell growths, which are very resistant to rays and malignant growths seated in the portion of the digestive tract comprised between the esophagus and rectum. There are two conditions in which opinion does not agree, namely, the use of the rays in carcinoma of the cervix uteri and alveolar cancer of the breast. In both, preoperative radiotherapy offers great advantages, as it does in any case of operable cancer, because it is easier to apply the treatment to tissues as yet not operated on and it prevents dissemination of the malignant cells when operation is done. When resorted to after operation radiotherapy is less active and it has also the disadvantage of hindering the process of cicatrization.

In inoperable tumors, excision after radiotherapy treatment is to be advised, as by so doing absorption of toxic products is prevented and the autoimmunization of the neoplasm against the action of the rays. In spite of certain advantages radiotherapy is merely a local therapeusis; it does not deal with the soil or the causal agent and it is perhaps too much to anticipate that in the future chemiotherapy may possibly take its place.

FATIGUE AND INFECTION

Some experiments carried out recently would seem to indicate that fatigue does not render an animal more susceptible to infection. The experiments were done on rats in a motor driven treadway. We are so accustomed to having time honored theories knocked about that we are not shocked at, though we remain highly sceptical to, the results of these experiments so far as their human application is concerned. What is fatigue for rats may not be fatigue for humans, and there enters into the problem the surroundings and behavior of the human being when he is supposedly fatigued.

Fatigue, in man at least, has never been clearly defined and we feel far from explaining its origin. There enter in so many different factors. It has been attributed to wear and tear in muscle and the accumulation of waste products in this organ. The condition of the nerve end plate seems concerned in the matter and a using up of the material of motor nerve cells has been found by good investigators. The accumulation of waste products in the blood is believed to take place, and a fatigue toxin was presumably discovered by one physiologist. But over all, in the human subject, there is the element of mental attitude. A class of girls in gymnastics will show the most evident signs of fatigue after a gymnastic lesson, and the teacher may fancy he has overdone the matter and imposed too much of a task, but immediately afterward, should a popular dance tune be struck up by the pianist, the whole class will be dancing as if they had had no previous muscular exercise. The pupils were suffering only from ennui.

Even the tests for fatigue of a few muscles, which were devised by the experimental psychologists, have, of late years, been considered very unreliable, the mental attitude element upsetting all conclusions. With so simple a test we do not know when the fatigue is physical or mental. If it has been difficult to define fatigue, it has been as difficult to distinguish fatigue from exhaustion. It is interesting to note that in experiments on dogs the personal equation comes in very markedly. Many dogs cannot be persuaded to run in a treadmill, while others will run till they drop.

After exercise the human being is more likely to put himself in a situation to become chilled or may conduct himself in other ways which will render him susceptible to infection for which the fatigue is not directly responsible. In this connection it should be mentioned that Vernon, in a study of the effect of fatiguing work in tin mills and other factories in England, could discover no definite relationship between fatigue and the incidence of sickness, what excess illness there was seeming to be due to carelessness about exposure to chilling when wet with perspiration. The subject deserves further study on other animals, and if a definition of fatigue can also be worked out by the investigators it will be of much value.

DEVELOPMENT OF THE NEURON IN THE ORGANISMIC PATTERN

Child makes a very interesting study of the development of the nervous system as a response, through the protoplasmic properties of excitation and transmission, to the stimuli of the environment. (*The Origin and Development of the Nervous System.* Reviewed in this issue.) When he comes to the discussion of the origin of the neuron pattern, considered in its separate phases, he makes some criticism of Kappers's theory of neurobiotaxis. He believes that this theory has to assume certain conditions not always present, as for example, the presence of functional neurons, although axons and dendrites first undergo differentiation in the nervous system, or as the presence of a fluid medium, when in truth the neuroblast is at first lodged in a very compact tissue. He briefly reviews Kappers's hypothesis as that of a shifting or migration of the neuron and the growth of the dendrite toward the locality from which the majority of the stimuli come. This process is explained as a galvanotaxis in an electrical field, the course of the axon being directed toward the anode, that of the dendrite toward the cathode.

Child seeks to avoid the difficulties he has pointed out and at the same time to enter more minutely into the possible reactions which explain the phenomena of growth in the nervous system. He adds to the theory of electrical attraction that of change also in physiological condition, which in turn rests upon differences which arise in polarization of the cell. A current passing through a living cell will cause migration of ions in opposite directions where, owing to the incomplete permeability of the cell membrane, they tend to accumulate at the opposite poles of the cell, negative ions at the side toward the anode, positive ones on that toward the cathode. This polarization alters the physiological condition and activity of the cell. There is much evidence for the fact that when internal electropositivity of the cell is increased directly by electrical means usually there is a condition of excitation or an increase of functional activity. Therefore the rate of cell metabolism, as of its physiological condition generally, is increased, with a corresponding decrease of activity in the region where increased negativity has taken place. The condition as regards the living cell, however, is that which must be remembered of the galvanic cell. The directions of the current within and without the cell are opposite as regards the polarization. If the cell is not in direct tissue connection with the medium in which it lies its polarization is opposite to that of the medium.

In the compact tissue of the neural tube the cell is in the condition of coherence with its surrounding tissue and the axon appears as at "the high end of a physiological gradient, electrically determined in each cell, by the electric currents of its environment." The cell body also appears to migrate in the direction of the greater physiological activity. The rate of growth of the axon tip may decrease as it grows further from the region of high positivity, other factors also entering, perhaps, to determine the relation of the axon to its peripheral organ. It is possible that the positivity of the peripheral organ may bring about the second type of polarization in the axonal tip, that of the reversal of the polarization, and so direct the growth of the axon toward itself. An axon appears to grow against a general body gradient when in reality it is following the local gradient which initiated its growth. In this the positivity is sufficiently strong to counteract the positivity of the general body gradient.

Such local gradients are probably frequent in the development of the central nervous system.

Child admits that there are probably more factors entering into dendrite development. Yet the problem may be briefly stated by saying that they represent a lower degree of dominance during growth. They doubtless express the same physiological effect of polarization but represent the opposite half of the current of the electrical circuit. That is, they grow toward the electronegative surface of the axon tract. The relation of the axons of certain neurons and of dendrites of others may be due to the "developmental or functional activity of the one and its effect on the direction of growth of the other. Different dendrites of a particular neuron may enter different electrical fields and so establish connections with different neurons, and it is conceivable that some dendrites may remain nutritive organs."

PREVENTIVE MEDICINE

No phase of medical service is now occupying so pertinent and important a position as that of preventive medicine. Doubtless one of the principal reasons for this present emphasis of the subject is the astonishing and distressing fact revealed by the draft examinations that more than fifty per cent. of our young men were found to be below par, in most cases from causes that might have been prevented. Director Louis I. Harris, of the Bureau of Preventable Diseases of New York, has in the *Monthly Bulletin of the Department of Health* for December, 1921, an article which is a contribution of unusual interest and value to the literature of this subject. One may not always agree with Dr. Harris in some of his criticisms, yet the trend of his suggested program for remedying some of the evils of present day conditions and for building up new lines of productive activity for medical practice are to be commended to the careful attention of the profession.

Dr. Harris writes: "The force of a powerful, and, if you so choose to term it, a subtle influence in favor of the reorganization of our system of medical practice is making itself heard and felt. Even though the advocates of such changes may have insufficient statistical data in justification of their demands, we cannot ignore them. We must take into account the increasing emphasis and extension of an old conception of the duty and obligation of the community, that is rapidly gaining converts, which is, namely, to guard in every way possible the welfare of the citizens comprising it. The proponents of this new social program stress the obligation of the community to tender adequate medical service to all persons who cannot secure such care out of their own resources, and reject every system or institution which offers doles, gratuities, or alms, no matter whether these come from private philanthropic individuals or groups or even from physicians. This view, whether we regard it as antagonistic to individual initiative and legitimate private enterprise, is held by an increasing number of social and legislative leaders. We cannot ignore it except at our peril."

The points emphasized by Harris are, in brief, as follows: The public must be made to realize the great contrast between the physician's assertions, based on long, difficult study and training, research and laboratory work, and wide experience, and the often shameless pretensions of the practitioners of the many medical cults and irregular forms of healing. Because of the recent multiplication of medical specialities, the general practitioner must now allow himself to become obsessed with an inferiority complex, but must aggressively assert his capacity for growth and adaptation in the service of his patients. He must not, if the case becomes trying and difficult, tire of it and abandon it to run the gamut of specialists or of the charlatans, most of whom have learned the value of a friendly and hospitable attitude toward their patients.

"It is greatly to be desired," says Dr. Harris, "that reorganization from within the profession should affect a close correlation between the general practitioner and the specialists, in order that the limits of independent practice of specialists would be defined, so that the unequal and losing battle which the general practitioner has been waging to hold his own against the increasing competition of the specialist may be ended and that the medical profession through its organized agencies, the county societies, should make the best skill available to all groups in the community needing special types of medical service." Hospitals, which are in the main under the control of private groups of philanthropic lay persons, should be opened to all practising physicians. The county medical societies ought to lead in this fight in behalf of the public weal. Although the pay clinic makes inroads upon the work of the specialist in particular, in establishing a flat fee, frequently excessively low, it sets a standard, which, if accepted by the public, must play havoc with the private practice of physicians; it employs physicians under contract service; it denies representation on its governing boards to the rank and file of its staff; and it may, without violation of medical ethics, make capital of its connection with prominent physicians.

Harris strongly advocates organization and cooperation among physicians to reduce expenses and long hours, to ensure proper advertising and publicity, and to bring about many other private and public benefits.

In closing he says: "It is to be hoped that this communication will cause the members of the medical profession to make a searching inquiry into the weaknesses, the pettiness and the lack of objective and leadership, which characterizes the conduct of our medical and public health societies, and that they will adopt vigorous and, if need be, drastic measures for the correction of these things, to the end that these societies may become the instruments of the cooperative, well organized effort to correct the defects of medical organization and service, and to rout and banish the small politicians who divert such societies from their higher duties to the public and their own membership. We need men of action whose hearts and whose minds are pure and courageous, and who, without personal greed or ambition, will lend themselves to high enterprises in the medical service for the public good and for the economic reorganization of the medical profession. . . "

DEMENTIA IN EPILEPTICS

Although present opinion tends to regard epilepsy as a syndrome from the clinical viewpoint, it nevertheless comprises two distinct groups, namely: epilepsy strictly speaking in which the syndrome dominates the clinical picture, and epilepsy secondary to determined cerebral affection, such as circumscribed lesions or the diffuse lesions of senility. The dementia which accompanies the second group of epilepsy does not present any particular characters. Epilepsy in these circumstances is merely an epiphenomenon superadded to the primary cerebral affection although it may hasten the evolution of the dementia by the addition of intermittent confusional periods which complicate the clinical picture in intervals. The appellation of epileptic dementia is reserved for the deficient states of epileptics belonging to the first group.

In the hereditary antecedents of demented epileptics, Brissot and Bourilhet (*La Démence chez les Epileptics*, Paris, 1921) have usually noted: insanity, epilepsy and alcoholism; in the personal antecedents: infantile convulsions, alcoholic intoxication and serious intercurrent infectious diseases. The age of predilection for the development of epileptic dementia is adolescence, between fifteen and twenty-five years. On the contrary, in organic epileptics, the intellectual decay progresses all the more quickly the older the patient. Given an equal intensity and repetition, the major paroxysms more rapidly lead to dementia than the minor paroxysms.

The most frequent psychic symptoms of epileptic dementia are, in order of importance: intellectual obtuseness, loss of memory and notions acquired by education, loss of judgment and incoherence. Physical signs may be absent, but when they exist they consist of disturbances of speech similar to those of general paralysis, exaggerated patellar reflexes, paresis of the pupil reflexes and paralyses, usually transitory. Tremor of the tongue or limbs is not so common. To these symptoms may be added cicatrices of the tongue or face, facial irregularity and a masklike expression, symptoms which should be regarded as stigmata of epilepsy. The evolution of epileptic dementia is intermittent and its duration indeterminate; if the fatal evolution is not interrupted by an intercurrent disease, death will ensue in terminal marasmus.

As to the clinical forms met with, the following varieties are to be distinguished: intellectual obtuseness which is generally the first phase of the following forms, simple dementia, the pseudogeneral paralysis type, epileptic dementia of the precox form, secondary dementias with epilepsy associated with insanity and lastly the dementia of debilitated epileptics. From the viewpoint of diagnosis, epileptic dementia presenting the pseudogeneral paralysis or dementia præcox forms may give rise to unsolvable difficulties.

Three principal indications govern the therapeutics of epileptic dementia, namely, the continuation of the medicinal treatment of the epilepsy, manual work in the open and an uninterrupted watch over the digestive apparatus. The treatment of epileptic convulsions and vertigo with boric acid has given appreciable results in the hands of Brissot and Bourilhet.

NEW HOSPITAL INFORMATION BUREAU.

A Hospital Information Bureau has recently been organized and established by the United Hospital Fund, with headquarters in the Annex of the New York Academy of Medicine, 15 West Forty-third Street. The object of the Bureau is to keep in touch with hospital work in the city, to furnish information about hospital facilities, administration, organization, record keeping and related facts, to study and make known hospital needs in the city, to maintain a library of hospital reports, statistics, record forms and blanks, to prepare exhibits, to publish annually at least reports about hospitals and hospital work, and, whenever called upon by hospitals, to cooperate in such administrative and efficiency studies as will be of value to both private and municipal hospitals.

The establishment of this valuable service is a result of the survey of hospital work in New York City made by the Public Health Committee of the

Academy of Medicine, of which Dr. Charles Loomis Dana is chairman and E. H. Lewinski-Corwin, Ph. D., is executive secretary.

The survey is notable as the first comprehensive study ever made of hospital facilities in New York City. It answers in detail many questions that have been coming up continuously in connection with the activities of physicians, welfare workers and laymen, such as: How many hospital beds are available to the people of New York? To what extent are present facilities utilized? How much nursing is done in New York hospitals by pupil nurses, by graduate nurses, and by substandard nurses? What percentage of beds do the New York hospitals have for neurological and mental cases? What proportion of the population is sick at any given time? What is the ratio of patients to employees? and many others. The survey and the resulting Information Bureau fill a long felt want in the city, and will serve as sources of valuable information to the people, the institutions, patients, technicians, social workers and philanthropists.

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News Items.

International Congress of Ophthalmology.—Dr. George E. de Schweinitz, of Philadelphia, was elected president, and Dr. Luther C. Peter, also of Philadelphia, was elected secretary of this congress, which met in Washington, D. C., April 25th and 26th.

Senate Passes War Hospital Bill.—Through passage by the Senate, Congressional action was completed on May 6th on the bill making immediately available $12,000,000 for construction of hospitals for former service men as a part of a program calling eventually for the expenditure of $17,000,000.

Psychiatrists Wanted at St. Elizabeth's Hospital.—The United States Civil Service Commission announces examinations to fill vacancies in the positions of assistant physician, junior assistant physician and medical intern in St. Elizabeth's Hospital, Washington, D. C. Applications will be rated as received until further notice.

New York and New England Association of Railway Surgeons.—The thirty-second annual session of the New York and New England Association of Railway Surgeons will be held at the Hotel McAlpin, Broadway and Thirty-fourth Street, New York, on Saturday, October 28, 1922, under the presidency of Dr. Donald Guthrie, of Sayre, Pa. A very attractive and interesting program is being arranged for this session.

Personal.—Dr. Homer Smith has moved his office from 276 Madison Avenue to 111 East Thirty-ninth Street, New York.

Dr. Francis X. Mahoney has been appointed health commissioner of Boston, to succeed Dr. William C. Woodward, who resigned recently after serving in that capacity since August 1, 1918.

Dr. S. Josephine Baker has been appointed consultant in child hygiene to the New York State Department of Health.

Röntgenology Laboratorians Wanted.—The United States Civil Service Commission announces examinations for laboratorians and assistant laboratorians in röntgenology to fill vacancies in these positions in the Public Health Service. Applications will be rated as received until further notice.

Nurses Needed by Government.—The United States Civil Service Commission states that there is need for nurses in the hospitals of the United States Veterans' Bureau and the Public Health Service and at Indian schools and agencies. Applications will be received for these positions until further notice.

Germantown Health Centre.—On May 4th the Germantown Health Centre was inaugurated, under the auspices of the Visiting Nurse Society. A medical advisory and working committee of twenty-five physicians are cooperating with the work. Dr. M. J. Karpeles is chairman and Dr. O. J. Day is secretary of the committee.

Class Reunion.—The Class of 1917 of Fordham University School of Medicine held an informal reunion banquet at the Hotel Astor, on Tuesday evening, April 25, 1922. The committee in charge included Dr. Thomas J. McKiernan, president; Dr. Joseph Haas, secretary; Dr. Michael J. Sweeney, Dr. John D. Verrilli, and Dr. Harry Rosenstein.

Westchester County Medical Society Holds Anniversary Meeting.—The Medical Society of the County of Westchester, organized in 1797, celebrated its one hundred and twenty-fifth anniversary on Monday evening, May 8th. Among the speakers were Dr. Frank S. Meara, Dr. Arthur Booth, Dr. George D. Stewart, and Judge J. Addison Young.

American Society for the Control of Cancer.—The following officers have been elected for the year 1922: Dr. Charles A. Powers, president; Dr. George E. Armstrong, Dr. Clement Cleveland, Dr. Livingston Farrand, Dr. Rudolph Matas, vice-presidents; Thomas M. Debevoise, secretary; Dr. Calvert Brewster, treasurer, Sir Arthur Newsholme, honorary vice-president. All these officers held office during the previous year, with the exception of Mr. Calvert Brewer, who replaced Mr. Howard Bayne as treasurer, Mr. Bayne having resigned because of pressure of other duties. Dr. Charles N. Dowd, Dr. John C. A. Gerster, Mr. Calvert Brewer, and Mrs. Samuel Adams Clark, all of New York, were added to the board of directors.

Joint Meetings of Anesthetists.—The American and Mid-Western Associations of Anesthetists will hold a joint meeting at the Hotel Jefferson, St. Louis, May 22d to 24th, and the American Medical Association has accorded the Associated Anesthetists a special anesthesia session in the Section on Miscellaneous Topics. For further information concerning these meetings address Dr. F. H. McMechan, Lake Shore Road, Avon Lake, Ohio, or Dr. Morris H. Clark, Twenty-third and Holmes Street, Kansas City, Mo. The Pacific Coast Association of Anesthetists held its first scientific session in a joint meeting with the Section in Anesthesiology of the California State Medical Society, at Yosemite, Cal., May 15th and 16th, under the presidency of Dr. George P. Waller, of Los Angeles.

Laboratory Aid in Bacteriology.—The United States Civil Service Commission announces an examination on June 7, 1922, for laboratory aid in bacteriology to fill vacancies in the Bureau of Animal Industry, Department of Agriculture, for duty at Denver, Colo.

Deputy Medical Examiner.—The Civil Service Commission of the State of New York announces an examination on June 3d to fill the position of deputy medical examiner, Bureau of Deportation, State Hospital Commission; salary $3,500. Candidates must be physicians licensed to practise in New York State and must have had not less than five years' experience in the practice of medicine including experience in the care of the insane.

Tuberculosis Number of the S. C. A. A. News.—The May number of *S. C. A. A. News* is composed of two sections, the second being devoted entirely to tuberculosis. It contains a record of the tuberculosis work of the State Charities Aid Association since 1907, presenting by counties a statement of the facilities, activities and results obtained during the fifteen years of a vigorous and well organized campaign. The legislative achievements of the State Committee on Tuberculosis and Public Health are also recorded and interesting statistics are presented showing that since the initiation of the campaign against tuberculosis by the State Charities Aid Association, the death rate from that disease has been cut thirty-four per cent.

St. John's Guild Program for 1922.—St. John's Guild opened the Seaside Hospital for Children at New Dorp, Staten Island, on May 8th, for a preliminary four weeks' season for the care of convalescent children. The regular season will open June 5th. Seaside Hospital accommodates three hundred patients, and special clinics will be conducted for the care of children suffering from the following conditions: Cardiac disease; malnutrition; chorea; cervical adenitis; nose and throat disease; defective teeth, and conditions requiring surgical dressings. The Fresh Air Section of the work will be done on the Floating Hospital, which accommodates, comfortably, about one thousand mothers with children. There, the guild is prepared to care for about forty sick babies needing night and day medical supervision.

Western Electrotherapeutic Association.—The fourth annual meeting of this association was held in Kansas City, Missouri, April 20th and 21st, under the presidency of Dr. Curran Pope, of Louisville, Kentucky. The guests of the society included: Dr. James T. Case, of Battle Creek, Michigan; Dr. E. C. Henry, Omaha, and Dr. Paul Gardner, president of the Medical Society of the Missouri Valley. The following officers were elected for the ensuing year: President, Dr. T. Howard Plank, of Chicago, Ill.; first vice-president, Dr. H. H. Bowing, of Rochester, Minn.; second vice-president, Dr. M. P. Springer, of Tulsa, Okla.; treasurer, Dr. W. P. Grimes, of Kansas City, Mo.; registrar, Dr. J. R. Shumway, of Pleasanton, Kansas; board of trustees, Dr. Frank J. Iuen, of Kansas City, Mo.; Dr. Curran Pope, of Louisville, Ky. The next meeting will be held in Kansas City, Missouri, in April, 1923. Dr. Charles Wood Fassett is secretary.

Annual Meeting of the A. M. A.—The next annual meeting of the American Medical Association will be held in St. Louis, Mo., May 22d to 26th, under the presidency of Dr. Hubert Work, of Pueblo, Colo. Dr. George E. de Schweinitz, of Philadelphia, is president elect, and Dr. Frank B. Wynn, of Indianapolis, is vice-president. Other societies which will meet in St. Louis at this time are: American Association of the Feebleminded, May 18th to 20th; American Association of Industrial Physicians and Surgeons, May 22d and 23d; American Proctologic Society, May 22d; Association for the Study of Internal Secretions, May 22d; Medical Library Association, May 22d and 23d; Radiological Society of North America, May 19th and 20th; Air Service Medical Association of the United States, May 23d.

Medical Advisor to State Insurance Fund.—Among the positions for which the New York State Civil Service Commission will hold examinations on June 3d is that for medical advisor, State Insurance Fund, Department of Labor; $3,250. Candidates must be licensed medical practitioners in this state and must have had at least six months of hospital experience. They must have an acquaintance with the principles of workmen's compensation and the provisions of the law relating to the same; and must be thoroughly informed on the theoretical and practical sides of medical service administration, including the examination of cases and the determination of the nature, probable duration and extent of disability; the organization of medical and hospital arrangements for the treatment of injured employees; the determination of fees for medical service and questions in general arising out of the relation between the insurance carrier, the employer, the employee and the medical profession.

Fox Hills Hospital to Be Sold.—The Government's hospital at Fox Hills, Staten Island, which was vacated recently by soldier patients being treated by the Public Health Service, will be sold at public auction on Friday and Saturday, May 26 and 27, in accordance with arrangements made yesterday by the Treasury Department through the United States Veterans' Bureau. The group consists of eighty-four buildings, and the conditions of the sale provides for their removal by July 30th. The hospital's patients have been transferred to other hospitals and Public Health Service institutions.

Fox Hills Hospital was completed in the spring of 1918 at a cost of about $2,500,000, and from that time until early this year, when it was ordered closed, it had been a source of constant annoyance to the Government because of protests against the environment and the service that was being accorded to the disabled veterans.

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Died.

Cabell.—In Richmond, Va., on Sunday, May 7th, Dr. Robert G. Cabell, aged seventy-four years.

McCormack.—In Louisville, Ky., on Thursday, May 4th, Dr. Joseph N. McCormack, aged seventy-four years.

Schoonmaker.—In New York, on Friday, April 28th, Dr. Perry Schoonmaker, aged sixty years.

Sutton.—In Hamburg, Germany, on Wednesday, March 29th, Dr. McWalter B. Sutton, aged forty-nine years.

Book Reviews

RADIOTHERAPY IN SKIN DISEASES.

X Rays and Radium in the Treatment of Diseases of the Skin. By GEORGE MILLER MACKEE, M. D. Illustrated with Two Hundred and Fifty Engravings and Twenty-two Charts. Philadelphia and New York: Lea & Febiger, 1921.

Dr. MacKee offers a detailed critique of x ray physics and radium which leads to a compact and relatively thorough understanding for the basis of x ray and radium dosage. Some of the physical discussion is probably irrelevant and is apparently included for the insurance of completeness rather than for practical necessity. This is followed by a presentation of diseases of the skin in which radium or the x ray is used with success. The diseases include certain infections by organism and fungi; eczema; psoriasis; lichen planus; pruritus; nevi; benign growths; malignant growths; tubercle infections; and other miscellaneous affections. A medicolegal chapter points out the legal relation between physician and patient as adjudicated in many cases in various courts.

It is easy to observe that the author has a brilliant clinical experience in dermatology and an unusually comprehensive grasp of the possibilities and limitations of x rays and radium energy. For the dermatologist there is probably no more authoritative text on the x ray and radium treatment of skin diseases; but it is felt that the book presents a more general and exceptionally useful purpose in its instructions on the physics and concepts of x ray dosage by which every x rayist and radiotherapist should be guided. It is difficult to commend this book too highly.

ANNALS OF RÖNTGENOLOGY.

Annals of Röntgenology. A Series of Monographic Atlases. Edited by JAMES T. CASE, M. D. Volume II: The Pathological Gallbladder Röntgenologically Considered by ARIAL W. GEORGE, M. D., and RALPH D. LEONARD, M. D. New York: Paul B. Hoeber, 1922.

This is the second of the volumes in the series of Annals of Röntgenology. The technic is summarized by considering the preparation of the patient, the important factor of which being that the patient present himself for examination with an empty stomach. Double intensifying screens and duplitized films are important. The Potter-Bucky diaphragm is considered of material help. The interpretation is based on direct evidence wherein gallstones will show as peripheral shadows, by which is meant the ringlike appearance of the stones. Roberts's classification of gallstones is presented as clinically useful and practical. The authors persist in their contention that the visualization of the gallbladder silhouette on the x ray film is indicative of gallbladder pathology. It is difficult to subscribe to this premise. With the advent of the fine focus Coolidge tube, the duplitized film, the speedy and practically grainless intensifying screen, and the Potter-Bucky diaphragm it is conservative to say that the gallbladder can be outlined irrespective of pathology in a rather large number of individuals.

Indirect evidence is useful in inferring gallbladder disease. It includes deformities due to pressure; secondary changes incident to adhesions; fixation of organs; spastic changes in the stomach; and, occasionally, obvious demonstrable changes in the gallducts. The writers lay claim to about eighty-eight per cent. of correct diagnosis in one hundred and twenty-eight operative cases. There are also, in this series, eight erroneous inferences on the negative aspect and seven on the positive.

The text is followed by an atlas that illustrates beautifully the major themes of the text. The general ensemble of the publication is to be commended; but it can not be conceded that its contributive value to the library of interpretative röntgenology is comparable with that of its mate volume on the mastoids.

X RAY DIAGNOSIS.

Grundriss der Gesamten Röntgendiagnostik innerer Krankheiten für Arzte und Studierende. Von Dr. FRITZ MUNK, Privat-Dozent an der Universitat Berlin. 2. verbesserte Auflage. Mit 193 Abbildungen. Leipzig: Georg Thieme, 1922.

This is the second edition of Dr. Munk's *Röntgen Diagnosis.* The first third of the book is devoted to elementary x ray physics and technic. The remainder of the book has to do with diagnosis. It is illustrated with line cuts and reduced röntgenograms. It is a general text excellently adapted for a difficult survey for the essentials of röntgen diagnosis.

A TEXTBOOK ON EPIDEMIOLOGY.

Epidemiology and Public Health. A Text and Reference Book for Physicians, Medical Students and Health Workers. In Three Volumes. By VICTOR C. VAUGHAN, M. D., LL. D., Chairman of the Division on Medical Sciences of the National Research Council. Assisted by HENRY F. VAUGHAN, M. S., Dr. P. H., Commissioner of Health of the City of Detroit, and GEORGE T. PALMER, M. S., Dr. P. H., Epidemiologist to the Department of Health of the City of Detroit. Volume I: Respiratory Infections. St. Louis: C. V. Mosby Company, 1922.

There are few persons who have had the extensive experience with the infectious diseases that is recounted by the distinguished author of this work in his preface. During a period of more than fifty-five years he has come into intimate personal contact with numerous epidemics, as a practitioner, a health officer, as a member of a special commission, or merely as an observer. In that time he has acquired a vast amount of information by observation, experimentation and study. His opinions and ideas have crystallized, the process having been facilitated no doubt, by his experience as a teacher, and are presented to us in this work of which the first volume has appeared. This volume is devoted to the respiratory infections, that is, those infections in which the virus most frequently enters the body through the respiratory tract. It is planned that the remaining infections shall be presented in the second volume and that the third volume shall be devoted to public health problems.

The author gives us a brief but ample discussion of the history of each infection, a proper discussion of its bacterial or other specific cause, and a few words concerning the pathology and symptomatology of the disease. The bulk of the text is given over to the discussion of epidemiology proper and a presentation of the methods by which control of the disease may best be obtained. His broad experience and sound judgment have made these portions of the work of exceptional value especially to health officers. An introductory chapter deals with his own theory as to the part played by protein split products in the development of infection and immunity and the production of symptoms. While this theory has perhaps not been accorded general acceptance, it certainly has sufficient experimental foundation to enable it to demand serious consideration. This volume is the most important on this subject that has appeared in many years.

PSYCHOPATHOLOGY.

Mind and Its Disorders. A Textbook for Students and Practitioners of Medicine. By W. H. B. Stoddart, M. D., F. R. C. P., Lecturer on Mental Diseases to St. Thomas's Hospital Medical School; Examiner in Psychology and Mental Disease to the University of London; Honorary Consulting Physician in Mental Diseases to the War Office, etc. Fourth Edition, with Illustrations. Philadelphia: P. Blakiston's Son & Co., 1922.

Dr. Stoddart was one of the first English psychiatrists to embrace psychoanalysis and has even given lectures on the subject. Always a keen observer and a diligent worker in his field, previous editions of this work have been eagerly welcomed. To the student of psychiatry be he undergraduate or physician the present volume will be a mine of information.

The chapter on diseases of the insane is excellent and might well be longer. The same may be said of the one on general treatment except for its too enthusiastic advocacy of drugs. The chapter on malingering is excellent and should be longer. More space than twelve lines should be given to the psychopathology of dementia præcox. His chapter on paranoia is especially good, but needs at least one lengthy case report. This in fact is a fault of the whole book; symptoms and syndromes are described, the former are exemplified, but the latter are only illustrated by crosssection glimpses and no life histories are quoted.

The chapters on alcoholic and drug addictions are misplaced in the book and in the parts devoted to opium and cocaine occur many mistakes, e. g., the assumption that the cure of the morphine habit is conditioned by the amount taken daily (page 410). This is not true. It depends more on six other thing: the duration of the addiction, the original cause, the patient's physical and nervous condition, the method of treatment used, the desire of the patient to be cured and the personality of the physician. Stoddart mentions the gradual withdrawal method which is extremely unsatisfactory, but he himself recommends the abrupt method which is barbarous and wholly unwarrantable.

With some of Stoddart's statements, both in psychology and phychopathology, many of the modern American psychiatrists would perhaps quarrel: his placing of the herd instinct above the sex instinct (page 76), his statement that women are altruistic, men egoistic (page 114), that there is a double hemiplegia in melancholia (page 166), that sex perversion is present in twenty-five per cent. of supposedly normal individuals (page 176), that the choice of art as a career means mental instability (page 202), that degeneration is not seen in savage races (page 203), that gigantism is not associated with mental disease (page 427), and so on.

He also differs from the American school in other ways. Thus, he describes catatonia major, catatonia minor, catalepsy and catatonia as separate entities. His division of manic depressive psychoses into periodical and intermittent serves no useful purpose. The undesirable term amentia is applied to imbeciles. Likewise he recognizes a moral imbecility, a misleading concept, and neglects the whole field of constitutional psychopathy.

A few minor criticisms are: *folie á deux* could be dismissed in a few words instead of three pages. In his chapter on combined psychoses he does not mention the combination of some other psychosis with a syphilitic one, the most frequent combination of all.

ORIGIN AND DEVELOPMENT OF NERVOUS SYSTEM.

The Origin and Development of the Nervous System from a Physiological Viewpoint. By Charles Manning Child, Professor of Zoölogy, University of Chicago. Chicago: The University of Chicago Press, 1921. Pp. xvii-296.

Child has here carried the theory of the axial gradient as the physiological condition of differentiation in growth to the explanation of the development of the nervous system. His effort is to keep before the mind the conception that development is a physiologically continuous process. In such a process one can understand through the quantitative differentiation in growth which the axial gradient represents how such a specialized organismic pattern can arise as that of the central nervous system. The inherent properties of protoplasm are excitation and transmission. These are found in the organismic forms of protoplasm, which are less simple but not different in nature from the primitive protoplasm. External factors exert a differential response on the part of these properties of excitation and transmission, so that the highly centralized form of the nervous system is merely a specialized response to environment on the part of these inherent properties. The nervous system becomes thereby the chief organ of the excitation and transmission so necessary for the life of the organism and the chief organ of the physiological integration. The axial gradient is merely the pattern, it simply is a statement of the fact of such a development, and of the carrying within it of hereditary potentialities.

Child therefore avoids any artificial introduction of a nervous system, he introduces no confusing theories of heredity. He attempts to maintain this simple attitude toward the physiological process which viewed in this way is sufficient to account for the high degree of differentiation in the nervous system. His way is followed with proofs but he propounds no conclusions as final. He is rather interested in the active following out of such a point of view with the suggestive possibilities opened up for psychology as well as in physiology and anatomy.

ABDOMINAL PAIN.

Abdominal Pain. By Prof. Dr. NORBERT ORTNER, Chief of the Second Medical Clinic at the University of Vienna. Authorized Translation by WILLIAM A. BRAMS, M. D., Formerly Lieutenant Commander, Medical Corps, U. S. N., and Dr. ALFRED P. LUGER, First Assistant, Second Medical Clinic, University of Vienna. New York: Rebman Company, 1922.

This work has to do with abdominal pain as a symptom and the help it gives toward a correct diagnosis and subsequent successful treatment of the pathological condition present. In studying the subject, the author adopts a topographical division—diffuse pain, pain in the epigastrium, right hypochondrium, right ileocecal region, etc., and under each of these heads considers the various kinds of pain—colicky, continuous, acute, not cramplike pains of short duration, recurrent pains, etc. In a final chapter, however, the process is reversed and abdominal pain is studied from the point of view of its character and associations—radiating pain, relation of pain to the intake of food, to defecation, to bodily motion, to constipation, to menstruation, etc. The author has covered his subject most thoroughly and has made a book that cannot fail to be of great assistance to the physician, especially the young one whose experience is not wide, in solving many a puzzling case of abdominal pain. The translation is in good English, free from the Teutonisms which so often mar the renderings from German into English.

POPULAR HEALTH EDUCATION.

Health and Efficiency. By THOMAS DARLINGTON, Ph. B., C. E., M. D., Professor of Anatomy, New York College of Dentistry; Consulting Staff, Broad Street Hospital; Chairman, Greater New York Medical Association for Borough of Manhattan; Formerly Commissioner of Health and President of the Board of Health, New York City. New York: Wynkoop-Hallenbeck-Crawford Company, 1922. Pp. 262.

Dr. Darlington himself states the purpose of his book as follows: "To present the reasons for, and the application of, the principles of physiology to the human machine in everyday working and living conditions. It is written also, partly as an ancestral obligation to some of those hardy pioneers who in the early years of our country helped to build for future generations." And elsewhere: "Much repetition will be found. . . . This has been deemed necessary in order that a lay reader may intelligently follow the subject." This last sentence connotes perhaps the chief criticism of the work—the effort to be "popular" seems at times a bit overdone; however, this is better than erring on the other side, as we realize when we consider the astonishing and ofttimes abysmal ignorance of the simplest health precepts on the part of the great mass of people for whom Dr. Darlington writes. Another minor fault strikes us toward the end of the book. Part of the theoretical side of the author's psychology in the chapter entitled Influence of the Mind Over the Body smacks a bit of the old fashioned school.

In scope Health and Efficiency covers the entire subject of personal hygiene, with the exception of the questions of alcohol, tobacco, venereal disease and sex. To explain these omissions the writer says: The passage of the Eighteenth Amendment makes education on the subject of alcohol the duty of the state. For the law can never be enforced until the citizens in general believe that the making of such a law was necessary. Were I to talk of the evils of tobacco no one would listen; and literature upon all sex questions can readily be obtained from departments of health, or societies which deal exclusively with such matters." These reasons seem hardly to justify the omission of discussion of such important health problems, concerning which the public are so sorely in need of proper enlightenment.

However, in spite of its few shortcomings, Dr. Darlington's book fills very definitely one of the long felt needs of medical service, namely, popular education in matters pertaining to health. The presentation of the subject is clear and simple, and the directions given are very definite and practical. The reader is struck with the large number of allusions to literature, the Bible especially, made by the author to "point his moral." Every public library would do well to have *Health and Efficiency* on its shelves and make a point of circulating it to the general public.

DRUG ADDICTION.

Opiate Addiction: Its Handling and Treatment. By EDWARD HUNTINGTON WILLIAMS, M. D., Assistant Physician, New York State Hospital System; Special Lecturer on Criminology and Mental Hygiene, State University of California. New York: The Macmillan Company, 1922. Pp. 194.

The author presents his subject simply, clearly and practically. His introduction is a rather full discussion of the Harrison Narcotic act and the results and failures of its enforcement. He feels that the best practical solution of the addiction problem would be to place it unreservedly in the hands of the United States Public Health Service. It could then be controlled by intelligent physicians who would have legal authority to enforce necessary clinical and custodial measures, and also have the facilities to work out unhindered its laboratory and clinical problems. Williams believes that, although gradual reduction has some advantages for special cases, any patient who can be treated successfully by this method can be treated with equal success, and perhaps more satisfactorily, by one of the sudden withdrawal methods. He feels that of these the Bishop method is the most suggestive, in spite of certain disadvantages, of the lines of future clinical and therapeutic development of addiction treatment.

HEREDITY.

Human Heredity. By CASPER L. REDFIELD, Author of *Control of Heredity, Dynamic Evolution, Great Men, &c.* Chicago: Heredity Publishing Company, 1921.

In the beginning of this book Redfield points out that Darwin specifically disclaimed any knowledge of or theory in regard to the evolution of brain power and consequently the Darwinian theory has no relation to the subject matter under discussion. The first chapter deals with the processes by which the powers of protoplasm are modified either toward increase or decrease of powers. Then follow several chapters which show the result of applying these processes to concrete cases. Mr. Redfield shows that by continuous exercise, animals and plants develop powers which they did not possess before, and frequently develop powers which never existed in any ancestor, and furthermore that these acquired powers are to some extent transmissible. It is because of this fact that human race has developed to its present degree of civilization. A formidable array of evidence is produced to show that the child profits intellectually when the father gets his education before he becomes a parent; in fact, that all the chances of achieving greatness are on the side of the latest born in a family. Mr. Redfield treats his subject in a thoroughly scientific way and has as his aim the improvement of the mental, physical and vital qualities of the human race. We anticipate that advocates of birth control will have a rather busy half hour refuting some of Mr. Redfield's arguments.

PERIPHERAL NERVE INJURIES.

The Surgery of the Peripheral Nerve Injuries of Warfare. By Harry Platt, M. S. Lond.), F. R. C. S. (Eng.). New York: William Wood & Co., 1921.

This volume comprises two Hunterian Lectures delivered before the Royal College of Surgeons of England, delivered on February 7 and 9, 1921. The first lecture was limited to physiological and anatomical considerations, such as nerve regeneration, nerve topography, and blood supply of nerve trunks; pathological considerations, such as the spontaneous neurotization of muscles; clinical considerations including diagnostic methods and clinical syndromes. The second lecture is devoted to the indications for surgical intervention, operative technic, and choice of operations. Analysis of over 500 operations are given with reference to end results. There are a number of excellent photographic illustrations. Medical men who buy monographs will find this one in the front ranks.

A TEXTBOOK OF BACTERIOLOGY.

A Textbook of General Bacteriology. By Edwin O. Jordan, Ph. D., Professor of Bacteriology in the University of Chicago and in Rush Medical College. Seventh Edition, Thoroughly Revised. Philadelphia and London: W. B. Saunders Company, 1922.

This excellent treatise on bacteriology, which includes pathogenic protozoology, is so well known to the medical profession through its six editions since 1908 that we need only note here the principal changes made in this new edition. The author states that the chapters on the Methods of Studying Bacteria, Influenza, and Anaerobes have been entirely rewritten while those on Streptococci, Pneumococci, Typhus Fever, Immunity and Yellow Fever have been very thoroughly revised. Minor changes have been made in other chapters. If a criticism might be made of Professor Jordan's work it is that in treating of the individual diseases and their pathogenic organisms he is dogmatic in asserting a true relationship between the two. The reader of a descriptive treatise of this kind likes to meet with positive statements, and the sensation of being balanced between the conflicting guesses of various observers is not pleasant. Not that the author must necessarily commit himself in doubtful cases, but he might at least indicate on which side he thinks the weight of evidence falls. However, some readers may prefer to form their own judgments and are content to have the evidence spread out before them.

COMPENSATION

Memoirs of a Midget. By Walter De La Mare. New York: Alfred A. Knopf, 1922.

Memoirs of a Midget is one of the really great books of recent years, and has a special interest in that it is a novel written by a man whose previous fame has rested on his ability as a poet. Miss M is a tiny but charming and exquisite bit of humanity who, the reader is led to believe, is somewhat less than two feet high. Her life, portrayed with such vividness, colorful beauty and delicacy of style, has been given by enthusiastic reviewers the most widely varying interpretations—a tribute to universal human appeal of the book. Probably to the physician the book will be of greatest interest as a personality study. Although Miss M is so decided a variation from Nature's socalled norm, and in spite of the fact that, for this reason, life among ordinary people often brings the most intense suffering to her unusually sensitive nature, nevertheless, because of the strength of a fine, wholesome character and a forceful will, Miss M succeeds in creating a life of no small degree of usefulness and beauty, not only for herself, but for many of those with whom she comes in contact. This life of hers is shown as a direct contrast to that of her beloved friend, Mr. Anon, also a midget, who allows his hypersensitiveness to make a hermit of him; also to that of Fanny, who to all appearances is a beautiful normal woman, but whose utter heartlessness and lack of certain moral attributes separate her from real life and the rest of humanity much more distantly than Miss M is separated. After reading the book one feels that life, no matter how hard and difficult it seems, may often be made worth while, even by and for some of those who appear to be most sorely handicapped.

PSYCHOLOGY.

The Psychic Health of Jesus. By Walter E. Bundy, Ph. D., Associate Professor of English Bible in De Pauw University. New York: The MacMillan Company, 1922. Pp. xviii-299.

After extensive and impartial quotations from the many psychological studies of the life of Jesus, Bundy states that most of these works are of little value and that more information may be had from a careful reading of the first three chapters of the New Testament than from any other source.

ROMANCE.

Nightfall. By Anthony Pryde, Author of *Jenny Essenden* and *Marqueray's Duel.* New York: Dodd, Mead & Co., 1921. Pp. 376.

The man with a not too shady past and the beautiful pastor's daughter live their romance in postwar England. Nobody works in this book; they all have stupendous incomes. But they left large parts of themselves on the battlefields, so one does not grudge them their leisure. The heroine, after years of domestic scrimping, dares to marry the millionaire and will doubtless live happy ever after. Quite a sprightly character is Isabel Stafford. She moves through the pages of the book by her own momentum and is real. The plot of the story is much complicated by war hysteria, helpless husbands, long suffering wives. *Nightfall* is a thoroughly enjoyable romance where everything turns out right in the end.

Medicoliterary Notes.

In the *Forum* for April are two articles on topics related to medicine: *Is Drink Killing England?* a plea for prohibition by Elizabeth Banks; and *The Transgressor's Easy* Way, a discussion of some of the causes of crime and methods of prevention, by Burdette G. Lewis, State Commissioner of Institutions and Agencies of New Jersey. Mr. Lewis has also an article in the *American Review of Reviews* for April entitled *Winning the Fight Against Mental Disease.*

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Insects as Chemists is the title of a very interesting article in the English *World's Work* for February. Among the chemical secretions of insects are the silk forming fluid made by spiders and caterpillars, beeswax, the poison acid injected into stings by ants, spiders, bees, wasps and some caterpillars, the gaseous vapors emitted by the musk beetle and the bombardier beetle, the milk of bees, etc.

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An interesting experiment is being carried on at Schloss Elman, twenty miles from Oberammergau. Dr. Johannes Mueller, founder and director of the institution, in a recent article in the *Vossische Zeitung*, states that his plan is not to conduct a hospital or sanitarium, but to afford a home for cases needing mental treatment. His methods, he says, are the simplest, based on common sense, the beneficial influence of art, literature and music, and especially the bringing of the patient in contact with as many types as possible of fine and interesting personalities. No chronic or violent cases are accepted.

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The National Committee for Mental Hygiene has recently compiled for distribution to those interested an excellent list of books on mental hygiene suitable for use in public libraries.

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Taboo, a play by Mary Wiborg, produced recently in a series of special matinees by Augustus Duncan, did not fulfill its promise of interest. The cast included both white and colored actors, and most of the honors belong to the latter. The plot is muddled and none of the acting was in any way noteworthy. The one really interesting thing about the play was that it revealed the great dramatic possibilities in the representation of the almost extinct Voodoo rites as practised by the once superstition ridden Louisiana negro ceremonies, now of significance as relating to a phase of American folklore.

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George Bernard Shaw's *Back to Methuselah*, presented by the Theatre Guild, is one of the dramatic milestones of the year. It is a modern elucidation of the old saying, "Faith can move mountains." Shaw believes that evolution, which, outside of human direction, is haphazard, should be made by man an ordered, conscious, scientific process. Man as a biological product can, he thinks, by the exercise of his mental faculties and his will, not only live as long as he wishes, but also make of himself and his life throughout future ages what he wishes. Moreover, if he proves unworthy of his possible destiny, Nature may cast him on the scrap heap and substitute another form of life through which to express her high purpose. Another thesis which Shaw tries to establish is that the trend of civilization is from action to argument. This is most cleverly demonstrated by the two actors satirizing Lloyd George and Asquith.

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The *New York Times Book Review and Magazine* for April 16th contains an interesting article by Maurice Francis Egan based on the *Reports of the Servants for Relief of Incurable Cancer,* covering the period from January, 1908, to October, 1912, and from January, 1921-1922. Two homes are maintained for the care and treatment of the poor suffering from incurable cancer, one at Hawthorne, N. Y., near White Plains, and another for patients too ill to leave New York City, at 71 Jackson Street. No payment from patients is allowed, and the homes aim to provide "no fewer comforts and consolations than the rich have." The founder and head of the homes is Rose Hawthorne, known to her patients as Mother Alphonsa. She is the daughter of Nathaniel Hawthorne, and the review quotes a statement from her as to how greatly the influence of her father's broad and never failing sympathy for all sufferers was directly responsible for her choice of her present work and her abandonment of all her former literary and artistic activities. Another strong influence was the early death from malignant cancer of the dearly loved friend of her youth, the talented Jewish poetess, Emma Lazarus.

New Publications Received.

THE AUTONOMIC NERVOUS SYSTEM. By J. N. Langley. Part I. Cambridge: W. Heffer & Sons, Ltd., 1921. Pp. 80.

THE PRIVATE CHARACTER OF QUEEN ELIZABETH. By Frederick Chamberlin. New York: Dodd, Mead & Co., 1922. Pp. xxi-334.

LES OCCLUSIONS AIGUES ET SUBAIGUES DE L'INTESTIN CLINIQUE. Par A. G. Guillaume. Paris: Masson et Cie, 1922. Pp. 304.

HANDBOOK FOR THE LIMBLESS. Edited by G. Howson. Foreword by John Galsworthy. London: The Disabled Society, 1921. Pp. xiii-245.

L'AMEE THERAPEUTIQUE MEDICATIONS ET PROCEDES NOUVEAUX. Par le Dr. L. Cheinisse. Deuxieme Amee, 1921. Paris: Masson et Cie, 1922. Pp. 152.

BOOK ON THE PHYSICIAN HIMSELF FROM GRADUATION TO OLD AGE. By D. W. Cathell, M. D. Baltimore, Md.: D. W. Cathell, M. D., 1922. Pp. 359.

PRACTICAL ORGANOTHERAPY. By Henry R. Harrower. Third Edition. Glendale, Cal.: The Harrower Laboratory, 1922. Pp. 416.

DISEASES OF WOMEN. By Ten Teachers. Edited by Comyns Berkeley, H. Russell Andrews, J. S. Fairbairn. Illustrated. Second Edition. New York: Longmans Green & Co., 1922. Pp. xi-641.

THE TREATMENT OF COMMON FEMALE AILMENTS. By Frederick John McCann, M. D. London: Edward Arnold & Co., 1922. New York: Longmans, Green & Co. Pp. vii-152.

LA REACTION DU BEJOIN COLLOIDAL. Et les reactions colloidales du liquide cephalo-rachidien. Par Georges Guillain. Paris: Masson et Cie, Editeurs, 1922. Pp. viii-143.

Practical Therapeutics

REPORT OF A SERIES OF CASES DEMONSTRATING THE THERAPEUTIC AND FOOD VALUES OF YEAST.

By Commander I. S. K. Reeves,
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To arrive at reliable conclusions in regard to the therapeutic and food values of yeast, the most desirable conditions exist in large institutions.

During the year 1920 and preceding years at the United States Naval Academy, a loss in routine work was occasioned by the number of midshipmen who suffered from boils. This condition had existed for years and all methods of prevention were found of little avail. The yeast treatment was suggested by the return of one midshipman from extended sick leave given on account of numerous and persistent boils. He was well, had gained forty pounds in weight, and said he had been cured by yeast.

In 1921 the use of yeast on a large scale was begun. It was given in the form of an ordinary yeast cake after each meal, some eating it as cheese, some masticating it and using water as a vehicle. The list on treatment rapidly increased, and as they were all given treatment at their own request, it would appear they perceived good results in their associates. A total of one hundred and thirty midshipmen took yeast regularly three times a day for several weeks and the following results were noted:

Forty-five were suffering from boils, the majority having had them for some time. Of these, thirty were rapidly cured, continued the treatment, and the boils ceased to occur.

Fifty-five took treatment to increase their weight. Thirty of these gained weight, one named above gained forty pounds, one ten pounds, ten gained five and ten pounds, and eighteen from one to five pounds.

Of twenty-two cases of acne, three were cured, seven patients improved considerably and seven increased in weight, but the acne remained the same, and five showed no results. All acne cases were also treated locally with Vleminckx solution.

Six took yeast for constipation, four were cured, two improved and continued treatment.

Four requested to try the treatment, stating they had indigestion; two reported themselves cured and two were still under treatment. The nature of these cases was not investigated, so diagnosis is obscure.

All men taking yeast were below par when they began, which might show only slight gains.

In the cases which were cured, the boils did not recur up to date of observation, which was two months later.

During ingestion period, the improvement in practically all cases indicated its value as a food ingredient.

The incidence of boils among midshipmen has undoubtedly been reduced to a remarkable extent by the treatment.

Almost invariably increase in weight and improvement in general conditions have occurred during treatment.

While the results of the treatment in cases of acne are doubtful, the results were such as to warrant further trial.

In constipation and indigestion, the results were good, but there were not cases enough to warrant conclusions in these conditions.

Of all patients taking yeast, no one complained of any ill effects nor have any been noted.

The willingness of large numbers of men to take this treatment would indicate their confidence in its therapeutic and food value.

Experimental Rickets in Rats.—I. H. C. Sherman and A. M. Pappenheimer (*Journal of Experimental Medicine*, August, 1921) regularly produced rickets in young rats with a simple diet consisting of patent flour, calcium lactate and sodium chloride, with or without ferric citrate. When 0.4 per cent. of potassium phosphate was added to this diet to replace a small part of the calcium lactate, the development of rickets was completely inhibited. Quantitative chemical analysis of calcium in the bodies of parallel rats showed a marked increase of calcium content in the rats receiving the added phosphate over those developing rickets. Pappenheimer and Sherman say that while x ray and histological examinations and quantitative chemical determinations show that added potassium phosphate increased the assimilation and normal deposition of calcium, the quantitative relationship between the inorganic ions rather than actual deficiency of any one of them may be the determining factor in the cause or prevention of rickets.

Production of Rickets by Diets Low in Phosphorus and Fat-soluble A.—E. V. McCollum, Nina Simmonds, P. G. Shipley and E. A. Park (*Journal of Biological Chemistry*, August, 1921) describe two faulty rations, containing two per cent. added calcium carbonate, which produced pathological conditions in the skeleton of rats essentially the same as those in human rickets. A small quantity of butter fat added to the ration, while insufficient to prevent the development of xerophthalmia, delayed its occurrence and its rate of progress. A diet having a higher calcium phosphate ratio than the others produced the most extreme degree of rickets. Observations have been made repeatedly by the authors that if calcium carbonate in large amounts (three to six per cent. of the whole ration) is added to a ration insufficiently supplied with the organic factor and only slightly or not at all deficient in its phosphorus content, most pronounced changes occur at the end of the long bones. The recent work of Sherman and Pappenheimer is discussed, in which rickets was produced in rats by means of diets containing patent flour, ninety-five per cent.; calcium lactate, three per cent.; sodium chloride, two per cent.; with or without the addition of one tenth per cent. ferric citrate. An addition of potassium phosphate in amounts equaling four tenths per cent. of the total prevented the development of rickets, and when no calcium was added to the faulty ration osteoporosis instead of rickets developed. In commenting upon this McCollum and his coworkers say that patent flour is one of the most deficient foods entering into the human diet, and that the ration employed by Sherman and Pappenheimer was deficient in fat-soluble A, water-soluble B, its protein content, potassium, phosphate, and water-soluble C. In the presence of so many deficiencies it is difficult to say which was operative in the production of rickets. It is stated by McCollum and his associates that apparently in the rat the profound disturbances in the deposition of lime salts in cartilage and bone and the changes in the cells of those tissues which give rise to the pathological complex known as rickets may be produced by disturbances in the diet of the optimal ratio between calcium and phosphorus in the absence of an amount of an organic substance contained in codliver oil sufficient to prevent them. It would seem from the results of a large number of experiments, which will be published in detail soon, that in so far as calcium and phosphate are concerned, the physiological relation in the diet between the two is of infinitely greater importance in insuring normal calcification than the absolute amounts of the salts themselves.

Nutrition Clinics.—J. B. Manning, H. L. Moon, H. C. Schumacher (*Archives of Pediatrics,* October, 1921) quote Retain's statement that the measure of nutrition is the best single indication of a child's state of health, and that much knowledge as to their general status can be obtained by a series of weight observations. It must be realized that the steady period of growth during the first six years of life is followed by active skeletal growth and a rapid increase in length between the sixth and ninth years. After a slower increase in length and breadth up to the eleventh year a period of more active gain in both weight and height follows between the eleventh and sixteenth year. This is a specially critical period, since latent tuberculosis often becomes active and chlorosis develops in girls. The authors report the interesting general finding that children on the Pacific Coast are above the average weight and height charts as scheduled by Emerson's and the Government's tables. Clinical experience has shown that the limits of the normal weight range should be fixed at seven per cent. below and twenty per cent. above the average. It has also been found that children generally did better at ten per cent. above the average level. Investigations based on these standards showed that the substandard condition of underweight children was manifested by lines under the eyes, fatigue, bad posture, pallor, adenoids, cervical glands, atonic musculature, visceroptosis, flat chest, signs of rickets, and nervous disturbances. Of 1,700 pupils in three public schools seventeen and a half per cent. were underweight. This figure, therefore, corresponds to the general findings in the country. In conclusion the authors urge the national importance of skilled examination of all school children, treatment of all physical defects and institution of nutrition classes for the instruction of children combined with efforts to spread better knowledge among parents.

Silica, Lime, and Magnesia in Cancerous Tissue.—Albert Robin (*Bulletin de l'Académie de médecine,* January 31, 1922) treated each of three cancer patients with preparations containing lime, magnesia and silicates. Chemical examination of the tumors postmortem showed that the quantity of silica in the tumors had been increased by fifty-eight per cent., that of lime by thirty-four per cent., and that of magnesia by six per cent. Thus, cancer tissue seems to have a particular tendency to fix silicates. Silica constitutes the most essential mineral constituent of connective tissue, the firmness of which varies according to the amount of silica it contains. Overgrowth of connective tissue, in turn, constitutes one of the factors in the defense of the system against cancer. Consequently it may be advantageous to supply an excess of silicates in cancer cases. In cancers undergoing retrogression the lime content rises sharply. In slowly progressive cancer of the liver, magnesia accumulates in the portions of the organ not yet involved; this suggests the possibility that resistance to the tumor by these tissues may be due to their high magnesia content. In the author's three test cases lime was given in the form of the glycerophosphate, 0.5 gram upon awakening in the morning; before the lunch and dinner, one gram of magnesium hydroxide was taken with a little water; during the same meals a cachet containing five grams each of sodium and potassium silicate and ten grams of magnesium silicate was ingested.

Effect of Foods, Accessory Foods, and Spices on the Pulse and Heart Respectively.—M. Heitler (*Wiener klinische Wochenschrift,* March 23, 1922) conducted a series of investigations to determine the effects of various foods, beverages, condiments and spices, as well as the effect of cooking, chewing and digestion upon the pulse and cardiac activity, and found that all the foods, accessory foods and spices, with the exception of very acid substances, coffee, tea and cocoa, had a stimulating effect on the heart. Water inhibits the depressive effect of stimulants from heating. The depressive substances become stimulants by their mixture with stimulants (in which sugar plays an important part), or their action is diminished. The depressive substances become stimulating after they are heated and water increases the stimulating effect. If the substance tested is applied to the palate the effect is greater than when applied to the mucosa of the cheek. Different portions of the same vegetables have different effects. Acids applied to the tongue cause depression of the pulse, applied to the mucosa of the cheek and palate they cause an increase of the pulse, but applied to the whole oral cavity, there is depression of the pulse. Spices, with the exception of onion and garlic, are stimulating when applied to the tongue, and mucosa of the cheek and palate; onion and garlic are stimulating when applied to the tongue, depressive when applied to the cheek and palate and stimulating when applied to the whole oral cavity. All foods are more stimulating when eaten raw than when cooked. Cold and heat are depressive and moderate heat has the most stimulating effect. The mixture of several foods has a stimulating, cumulative effect. The act of chewing causes depression of the pulse; the effect of stimulating substances is diminished, and that of depressive substances is increased thereby. Porcelain and glass receptacles are stimulating, also those of silver, gold, iron and nickel; lead, copper and German silver are depressive, but wood is indifferent. The entrance of the substance into the stomach causes similar changes in the pulse as their application to the tongue or mouth respectively, but the change in the pulse is greater and of short duration. The diminution of the pulse is associated with lowered blood pressure.

Treatment of Pyelitis by Intravenous Therapy. W. C. K. Berlin (*Medical Record,* April 8, 1922) has had good results from intravenous injections in pyelitis of hexamethylenamine in twenty grain doses in twenty c. c. capsules alternating with capsules containing a twenty c. c. solution of sodium iodide twenty-eight grains, creosote and guaiacol of each one eighth grain in slightly alkaline normal solution. Berlin believes that the anatomical and postural environments of the kidneys are the chief factors predisposing to pyelonephritis. Intestinal stasis, autointoxication and autoinfections from different foci are no doubt the immediate cause of pyelitis. In metastasis the blood stream is the means of transmitting the infection to the pelves of the kidneys. Therefore, intravenous injections of selected solutions may attack the bacteria either *in situ* or in transit through the blood stream.

A New Method of Demonstrating Rail Fibres.—Rudolf Maresch (*Wiener klinische Wochenschrift,* March 23, 1922) describes a technic for the demonstration of the rail fibres and delicate collagen framework in normal and pathological tissues with a solution of methyl green picrate, prepared by mixing equal parts of a concentrated methyl alcoholic solution of picric acid and a like solution of methyl green. This mixture is poured into an air tight cylindrical glass. The sections are dried in the usual way on glass slides, freed of paraffin, treated with absolute alcohol for a short time and then placed into the methyl green picrate for ten minutes, or even longer. It is advisable first to wash off the absolute alcohol with a few drops of methyl alcohol. The stained specimen is then quickly rinsed with water and counterstained with a few drops of a five tenths per cent. to one per cent. (at the most) watery solution of acid fuchsin, which is removed after five to ten seconds with water, or preferably with blotting paper. The water is removed by adding a few drops of absolute alcohol, which produces a pale grayish violet tint. The section is then cleared in xylol and mounted in Canada balsam. The nuclei show a violet color, the plasma is more or less pale red, acidophile granules are yellow, basophile granules are intensely dark red and the erythrocytes stain green. The coarser collagen fibrillar bundles appear violet red and the rail fibres are blazing light red, whereas the glia fibres show only a pale rose red tint. This stain is adapted to the staining of lymph nodes, spleen, bone marrow, skin and various granulation tissues, as well as neoplasms; it is especially adapted to the staining of the basophile granular cells in the anterior lobe of the pituitary body, which it distinctly differentiates from the sulphur yellow acidophile granules and pale red ungranulated cells by a deep dark red tint.

Antipneumococcic Serum in Pneumonia and Bronchopneumonia of the Aged.—Weill-Hallé, Weissmann-Netter, and Aris (*Bulletins et mémoires de la Société médicale des hôpitaux de Paris,* February 9, 1922) report eight cases of pneumonia in persons fifty-eight years of age or over treated with a polyvalent pneumonia serum prepared at the Institut Pasteur. Seven of the eight patients were between seventy-three and eighty-eight years of age. Six patients recovered and two died. One of the deaths was due to senile gangrene of the leg which followed apparent recovery from pneumonia. The other death was due to bronchopneumonic involvement in the opposite lung, for which no serum treatment was given. The amount of serum injected in this series of cases was but twenty mils a day, given daily or on alternate days, according to the temperature and general condition of the patient. Stress is laid on the tolerance of these aged subjects for serum treatment. Only one patient showed a brief temperature rise with slight urticaria. Marked improvement in the general symptoms followed the use of the serum, although the local physical signs ran the same course as in pneumonia not thus treated. Yet some patients were enabled to get out of bed on the seventh day after the onset of lobar pneumonia. One of the patients who recovered was diabetic and alcoholic.

X Ray Treatment of the Hematopoietic Organs in Pulmonary Tuberculosis.—Trémolières and Colombier (*Bulletin de l'Académie de médecine,* February 14, 1922) reports twenty-three cases of advanced lung tuberculosis treated with good results by x ray exposures of the spleen and long bones. The focus over the spleen was at thirty-seven centimetres, with a current of 78,000 effective volts and two milliampères. One to three millimetres of aluminum was used and the dosage nine tenths of an H unit. Weekly sittings were given. Notable improvement was always seen by the seventh or eighth sitting. The treatment was never continued beyond the fifteenth or sixteenth sitting less splenic activity be exhausted. The temperature curve showed improvement even after the earlier sittings, in most instances. Sweats also rapidly ceased. Cough increased up to the fifth or sixth sitting, then subsided rather rapidly. All patients gained weight more or less rapidly. The number of tubercle bacilli generally increased up to the fifth or sixth sitting, then showed a very distinct reduction, with lessened expectoration. About the seventh or eighth sitting, in the majority of cases, morphological changes in the bacilli were seen, the bacilli becoming longer, forming chains, becoming curved, and showing numerous granulations—all regressive changes in the microorganisms. In two cases the bacilli disappeared entirely at the twelfth sitting. The leucocytes in the blood showed at first a reduction, then a leucocytosis. In nearly all instances there was a slight set back in the patient's condition at about the seventh sitting; but subsequently improvement soon set in again, and was accentuated by later treatments. In patients completely at rest the temporary set back was much less marked than in others. On the whole, the results obtained are deemed very encouraging, although the duration of the beneficial effects is as yet not definitely known.

Treatment of Typhus.—A. M. Caccini (*Military Surgeon,* April, 1922) gives the following treatment for war typhus: As we have no specific means of medication as yet, we will have to be limited to symptomatic treatment and cure. We may here mention the utter failure of the use of quinine as a specific. Cardiac stimulants must be used, giving the preference to strychnine and caffeine. Constipation must be controlled within the first few days. Contrary to general belief and practice. the use of antipyretics is a bad one; instead, cold pack and cold baths are indicated. General cleanliness of the skin to a certain extent and of the mucous membranes in particular is the very best of practices in order to diminish the probability of the formation of abscesses, bed sores and gangrenes. Feeding should be attended to most scrupulously and should be most substantial.

Muscle Angioma of the Deep Musculature of the Neck (Rhomboideus Minor Muscle).—Hans Finsterer (*Weiner klinische Wochenschrift,* March 23, 1922) reports this rare condition in a girl nineteen years old, who for six months showed a gradually increasing tumor, associated with increasingly severe pains, especially at night when lying down. Various diagnoses were made, but aspiration of the mass revealed the presence of venous blood, establishing thereby the diagnosis of hemangioma. The tumor, as large as a fist and partially compressible, was extripated. The histological examination confirmed the diagnosis. These tumors are usually congenital in origin. The fact that the tumor enlarges when the patient lies down and becomes smaller on standing up with simultaneous relief from tension pain, associated with the objective compressibility of the mass and increase of the circumference of the neck, should suggest the possibility of the presence of this condition. It must be differentiated from cold abscess and lipoma, particularly in regard to therapy: early operation is especially indicated, as these angiomas have a tendency to displace the neighboring structures and even to perforate bones.

Practical Significance of Principles of Habitus and Renaissance of Humoral Pathology as a Therapeutic Consequence of Constitutional Teachings.—B. Aschner (*Wiener klinische Wochenschrift,* February 2, 1922) discusses the moot question of the interrelationship of habitus and constitution, as regards the significance of pigment contents, temperament, internal secretions, blood mixture, the question of hypotonia and hypertonia, especially in the field of gynecology, and emphasizes the basic difference between the sexes. Females show a predisposition to asthenia, enteroptosis and a similarity to the childish organism in a greater irritability of the nervous system and a more rapid and more abundant blood formation, and also a greater tendency to neoplasm formation. The significance of constitution is seen in the humoral general diseases in contrast to the exogenic factors, and therapy must be governed accordingly, as, for example, in menstrual, climacteric and postclimacteric disorders and other female diseases. In regard to therapeutics there is an increased significance in the treatments with aperients and other derivative remedies, but especially with venesection, the extensive application of which the author warmly recommends.

Early Weight Bearing.—P. D. Wilson (*Journal of Bone and Joint Surgery,* April, 1922) in a consideration of early weight bearing in the treatment of amputations of the lower limbs summarizes as follows: 1. Experience gained during the war in the treatment of patients with amputations of the lower limb has shown that it is possible to get such patients out of bed without crutches and actively bearing weight in peg legs or simple forms of artificial limbs at a period two to three weeks after amputation. 2 Early weight bearing is of great advantage to the patient because it promotes healing of the wound by improving the circulation, and in cases with terminal localized osteomyelitis favors the separation and spontaneous discharge of sequestra. It hastens stump shrinkage and prevents muscle atrophy and the development of joint contractures. It favorably influences the patient's morale. It greatly shortens the period until the permanent artificial limb can be fitted and reduces the need of frequent alterations in the socket, and thereby much expense to the patient. Provisional apparatus to secure early weight bearing may be made to best advantage of simple materials, in the use of which the surgeon is already skilled. With understanding of the advantages of early weight bearing in the treatment of amputations of the lower limb, and of the little difficulty involved in its application, the method should be universally applied.

Iodine Reaction in the Diagnosis of Typhoid Fever.—M. Pivano (*Minerva Medica,* Turin, March 15, 1922) remarks that Petzetakis in 1917 described a new reaction which was of value in the diagnosis of typhoid fever and in the prognosis of advanced tuberculosis. It consists in putting fifteen to twenty c. c. of urine in a test tube and overlaying it with a few drops of a five per cent. alcoholic solution of iodine. The reaction is positive when there is produced in the upper stratum of urine a change in color to a yellowish gold of varying intensity. The presence of albumin, sugar, or other pathological elements, does not disturb the reaction. The test further antedates the appearance of the Widal by several days thus aiding in the early diagnosis of suspected cases. In one case of Pivano's the iodine reaction was positive on the sixth or seventh day, while the Widal was persistently negative; a positive blood culture was obtained on the twentieth day and autopsy verified the diagnosis of typhoid.

Ultraviolet Ray in Dentistry.—L. B. Lipman (*American Journal of Electrotherapeutics and Radiology,* October, 1921) concludes: 1. That the quartz light has a therapeutic value in the treatment of certain oral conditions. 2. That it is destructive to Vincent's bacteria. 3. That its stimulating qualities are especially valuable, in the treatment of morbid gum conditions. 4. That the results obtained are more rapid under treatment with the light than with other chemical agents. The author does not mean to imply that the quartz light is a cureall. There are cases of pyorrhea, he says, which are especially hopeless and in these cases the ultraviolet ray is just as ineffectual as other treatment. But, observation has shown that those cases which have not yet reached the hopeless stage will respond more rapidly to light treatment than to other means.

Diagnosis and Treatment of Hydrocephalus.—Walter E. Daudy (*Surgery, Gynecology and Obstetrics,* February, 1921) states that blocking of the foramina of Luschka and Magendie invariably produces hydrocephalus. Patency of one of the three foramina prevents the development of hydrocephalus, provided the subarachnoid space is normal. A group of cases is presented with occlusion of these foramina and with a hydrocephalus resulting therefrom. Undoubtedly, the disease, occurring in adult life, follows an inflammatory process which may or may not have been clinically evident. Probably failure of the foramina to develop accounts for the hydrocephalus in many cases which are recognized soon after birth; in other infants an intrauterine or postnatal inflammation is the cause. Although the general results of the occlusion are the same in every case, there are marked local anatomical differences due to the extent of the inflammatory process and the time of its development. There are no clinical features which permit one to make an absolute diagnosis of occlusion of the foramina of Magendie and Luschka. In every instance, both in adults and infants, the diagnosis of hydrocephalus is possible; the exact site and the character of the obstruction causing the hydrocephalus can be determined by ventriculography and by the phenolsulphonephthalein test.

Lactation and Menstruation. — St. Engel (*Monatsschrift für Kinderheilkunde,* January, 1922) reviews theories concerning the stimulation of the mammary glands by ovary, corpus luteum, and placenta. A similar effect has been ascribed to the tissues of the fetus and even to an internal secretion produced by glands forming in the wall of the gravid uterus. On the other hand, clinical experience demonstrates that the breasts may affect the primary sexual organs. This is evidenced by stimulation of uterine contraction provoked by suckling; by lactation atrophy of the uterus and by suppression of menstruation during lactation. In the past return of the menstrual flow during lactation was generally considered to be an unfavorable event. Often it was even taken as a signal for weaning. However, it is now accepted that the onset of menstruation is not at all exceptional and does not imply any detriment for mother or child. Finkelstein in his recent textbook states that one half of all mothers menstruate before weaning and one third even within the first three months. Experience has shown that actively functioning breasts are not obviously affected by menstruation, nor even by a supervening conception. On the other hand, the author has been able to show in clinical studies that weakly secreting breasts show a definite connection with menstruation. It is a fact that the period returns within the first few months in women who do not produce more than six hundred c. c. of milk; and the less the amount of milk secreted the sooner menstruation returns. Naturally it follows that menstruation is not at all suppressed in cases where the mammary activity is markedly deficient.

The author suggests a formula for determining the date at which the return of menstruation may be expected. The result of subtracting two from the number of one tenth of a litre of milk secreted during the day represents the number of months. Thus, if 0.6 litres of milk are produced, menstruation will reappear 6—2=4 mouths after delivery. The interesting question arises how the menstrual function is influenced by the quantity of milk produced. Curves recording milk secretion show that the maximum output was only maintained for a short period. A gradual decline then occurred and about four weeks later menstruation supervened. Cumulative evidence of this nature permits the conclusion that the return of menstruation is the consequence of a functional decline of the mammary glands. The reverse suggestion that secretion ceases as a result of menstruation is incorrect. The curve of milk production shows that appearance of the menstrual flow has no effect on the quantity of milk secreted.

The author points out that the mechanism by which the breasts exert their influence on the primary sexual organs may be in the nature of an internal secretion.

Fracture of First Lumbar.—R. V. Gorsch (*Annals of Surgery,* March, 1921) summarizes as follows: 1. Bismuth mixtures can be injected into the bronchi and lungs of a living patient without danger. 2. The injection of an opaque substance into the lung of the living patient will open an enormous field of usefulness in the study of cough, the expulsion of substances from the lung, and lung drainage. It will also aid in localizing bronchial strictures in the same manner as in the esophagus. Furthermore, it will be of the greatest aid to the thoracic surgeon by mapping out the abscess cavity in the respective lobe of the lung. A definite lung abscess cavity is seldom seen bronchoscopically. Pus is usually seen coming from a branch bronchus, although the abscess may be well around the corner, and not in that portion of the lung from which the pus is oozing. An injection of bismuth mixture or some other opaque mixture will clear up this error. 4. Bismuth when it enters the abscess cavity is recognized by its metallic lustre, whereas, when it is in the lobular lung structure, it is discerned as a dull, opaque area. Pus diffuses and soaks the lobular structure in a manner similar to bismuth; this often makes the involved area appear many times larger than it really is. 5. The bismuth mixtures injected in these patients was eight c. c. of bismuth subcarbonate in pure olive oil one to two. The mixture is rendered sterile by boiling before injection. 6. The injection should be made slowly and not with a "squirt" or else the röntgenographic observations may be spoiled by bismuth soaking the lung structure surrounding the diseased area. 7. It seems from these preliminary studies that cough and action of cilia are not the only means of expelling secretions. 8. While bismuth mixtures were originally injected for the purpose of lung mapping in cases of lung abscess cavities, they seem to have been of therapeutic benefit to the five patients upon whom they were tried. So far the procedure has done no harm. 9. While the fluoroscopic examination is important, stereoröntgenographic examination is the best means of localizing the cavitations. 10. Experience has shown that the röntgen examination should be made almost immediately after the removal of the bronchoscope, otherwise the patient, in a fit of coughing, will remove much of the bismuth from the involved lung.

Proceedings of Societies

MEDICAL SOCIETY OF THE STATE OF NEW YORK.

One Hundred and Sixteenth Annual Meeting Held in Albany, April 18, 19 and 20, 1922.

The President, Dr. JAMES F. ROONEY, of Albany, in the Chair.

President's Address.—Dr. JAMES F. ROONEY, of Albany, stated that it must be apparent, even to the most indifferent, that there was a ferment of unrest which had leavened the body politic these last twenty years and that the human race the world over was sick. The profession of medicine as a part of the body politic, that part which more than any other had been brought into contact with the miseries of humanity, need now more than ever to summon all its coolness and clear reasoning, its altruism and its compassion, to do its utmost in the work of healing the wounds of the world.

Oration on Surgery: The Art of Surgery.—Dr. JOHN B. DEAVER, of Philadelphia, asserted that the art of surgery was as old as history itself. Hippocrates did not sanction the too prevalent attitude of modern times that the surgeon was a mere mechanic but rightly considered him a healer skilled in the use of instruments. With the discovery of ether anesthesia by Crawford W. Long, in 1842, the era of modern surgery began. In the course of the next twenty-five years the work of Lister and Esmarch had combined to develop an art which had been confined to emergency surgical procedures into one which had been robbed of its terrors, and which had been the means of diminishing and even abolishing much of the suffering of mankind.

An indispensable factor in the development of the surgery of our day was, of course, animal experimentation. It had probably done more than anything else to widen the boundaries of our knowledge, by substituting for vague theories more exact knowledge and refined methods of procedure. Our entire method of study and investigation had its base in experimental work. It was incomprehensible to him, Dr. Deaver declared, how any rightminded individual could spend time, effort and money in furthering propaganda against this indispensable adjunct to the progress of medicine. The spirit of investigation should be developed instead of being hindered. It should be subsidized instead of being taxed.

Progress in surgery was not dependent upon clinical and animal experimentation alone; equally essential for surgical diagnosis and treatment were the researches in the field of bacteriology, chemistry, physics and physiochemistry. However, with these aids at our disposal we were in danger of losing the advantage of the highly trained senses which our ancestors developed and which to a surprising degree enabled them to detect obscure signs.

One of the principles of surgery which modern methods had developed to a remarkable degree was that of the least amount of tissue injury with the conservation of the maximal function. A proper understanding of the chemical changes that took place during the process of metabolism was most essential to bodily functions in health and disease. We must ever remember that with promise for the future closer contact with the anatomist, the physiologist, the pathologist, the pharmacologist and the biochemist was essential. With the constantly deeper penetration of the science into the art of surgery, operative mortality had been reduced to a minimum in a large class of cases. In cancer of the breast it was almost negligible, less than one per cent. In uncomplicated chronic appendectomy it was now considered practically nil. For other abdominal operations the death rate was constantly decreasing.

This was all the more interesting and gratifying in view of the fact that most of the abdominal operations commonly practised today were comparatively late arrivals in the surgical arena. Not a little of the satisfactory reduction of operative mortality was due to improvement in methods of administering general anesthetics. Local anesthetics had come to occupy an important place in operative surgery, particularly in certain types of cases in which a general anesthetic would be attended with too great risk. The method of anociassociation as developed by Crile was proving particularly useful in the socalled bad risk patients, such as the cases of exophthalmic goitre.

Another factor in the improvement of operative mortality was rapidity of operation, not the record breaking surgical gymnastics that appealed to the gallery, but the quickest maneuvers and minimum of manipulation consistent with exact and careful work. Simplicity was also an important item in the surgery of today, and in every act it was the virtue that reigned supreme. The personal equation of the operator—or rather of the surgeon, for there is a vast difference between the two—was a vital factor in successful surgery today. Postoperative methods had undergone a change in our day. An erroneous impression that was rapidly being corrected was that functional rest was an essential factor in postoperative treatment. Today the wound was allowed to heal with the minimum of interference and the maximum of rest. But with regard to function their efforts took the opposite course. In the treatment of sprains, dislocations and fractures, instead of prolonging bandaging and rest, they encouraged, whenever possible, early activity of the muscles, and passive and active movement of operated joints, so that by the time union of the bone had taken place the muscles and joints were in a more or less normal condition. Free respiration was essential not only after all operations on the thoracic region, but after abdominal operations as well. To avoid postoperative adhesions and to obtain the necessary freedom of respiration, they made their patients assume a semisitting position, in or out of bed, as early as the second day after operation.

SECTION IN MEDICINE.

Treatment of Anthrax by Local and General Administration of Antianthrax Serum.—Dr. JOSEPH C. REGAN, of Brooklyn, affirmed that the value, both prophylactic and curative in animals, and therapeutic in man, of antianthrax serum must now be regarded as established by statistics. The method which seemed most successful was that of administering ten c. c. of antianthrax serum by local infiltration, every eight hours, and forty c. c. intravenously, every four hours. Anthrax serum fulfilled best the points requisite for an ideal method of treatment of anthrax. It was applicable to all forms and locations of the disease. It yielded, on an average, in a large series of cases, by far the lowest mortality rate. It was a specific measure. It was a safeguard against generalization of the local disease, if used in time. It offered the least amount of scarring and deformity. It caused a minimum of pain. It demanded, on an average, a relative short absence from employment. It was a reliable method, and might be expected to cure all cases, if administered before septicemia had set in.

Sequelæ of Encephalitis Lethargica and Their Treatment.—Dr. LEWELLYS F. BARKER, of Baltimore, stated that statistics based upon careful followup work had already indicated that complete recovery from encephalitic lethargica was the exception rather than the rule. Perhaps seventy-five per cent. of patients exhibited residual phenomena that were more or less serious. Hence a guarded prognosis should be given. A great variety of postencephalic syndromes had come to observation and description. In motor domains they included hypokinetic phenomena (pareses, paralyses) and hyperkinetic phenomena (myoclonic, choreic, athetosic, convulsive). Extrapyramidal motor disturbance also had been especially prevalent. In sensory domains anesthetic, hyperesthetic and paresthetic syndromes were described. Disturbances of coordination (ataxia, asynergy) had not been uncommon. Further, many autonomic disturbances (vasomotor, secretory, trophic, respiratory, circulatory, nutritional) had been described. Perhaps most common of all sequels had been certain postencephalic disturbances of the psyche in the form of character, cognative, affective or conative disorders. A Parkinsonian syndrome was a frequent postencephalitic sequel, doubtless due to the predilection of the virus for the corpus striatum, especially the globus pellidus. It was surprising, Dr. Barker said, how frequently autonomic symptoms and signs were demonstrable over long periods after recovery from epidemic encephalitis. Particularly common were certain pupillary and ciliary disturbances. Sialorrhea with constant spitting was frequently met with; xerostomia was less common. Among the nutritional disturbances reported, rapidly developing obesity seemed to be the most common. The mental disturbances in acute neuraxitis were those of the acute organic types of mental reaction of the character described by psychiatrists as toxic infectious psychoses. A considerable proportion of children were rendered permanently deficient. Even in adults there might be loss of memory and judgment. A behavior characterized by motor agitation had been occasionally observed. Many who had studied the psychotic and psychoneurotic manifestations following epidemic encephalitis had been impressed with their aping of various minor and major psychoses. This aping of processes hitherto regarded as functional by the sequels of a disease in which there were known to be definite and extensive diffuse and focal organ changes within the brain was suggestive. Many had through this been confirmed in their opinion that the distinction between organic and functional processes was merely one of degree. It would seem probable that every gradation might exist between gross structural alterations that were visible to the naked eye and finer and subtler changes that could not be recognized as yet, even with microscopic examination, but that might some day be demonstrable in chemical composition.

Results of Active Immunization with Diphtheria Toxin Antitoxin in the Schools in New York City.—Dr. ABRAHAM ZINGHER stated that the results obtained during the past eight years by these methods had been very favorable, having shown that eighty-five to one hundred per cent. of nonimmune children became immune to diphtheria after the first series of toxin antitoxin injections. In the schools they had met with great variations in the results of immunizing injections with the same strength and preparation of toxin antitoxin. In retesting children who had had one series of injections the discrepancies varied all the way from seventy-five to eighty per cent. of successful immunizations in some schools to twenty-five to thirty per cent. in other schools. It was found that the percentage of those becoming immune after receiving one series of inejctions of toxin antitoxin was in inverse proportion to the percentage of positive reactions following the original Schick test. Where the number of positive Schick tests was high the number of children becoming immune after one series of injections was low. The reverse was likewise true. It was found that the children in the poorer sections of the city gave fewer positive reactions to the Schick test and responded to the toxin antitoxin injections with a higher percentage of immunes than the children in the better sections of the city among the well to do. They had obtained as high as sixty to seventy per cent. of positive Schick reactions with the original test in schools located in certain sections of the city among the better classes, while in schools in crowded sections of the city only fifteen to twenty per cent. gave positive Schick tests. The explanation was that the children in the poorer sections were often exposed to mild doses of diphtheria organisms which brought about a certain degree of natural immunity. Among the children of the better classes this exposure was not present, because they were segregated and isolated, and they therefore remained susceptible. It was evident that the toxin antitoxin brought about a better response in the children in whom antibodies had been stimulated by previous exposure. Even if they gave a positive Schick test they responded readily to the immunizing doses of toxin antitoxin. Thus far over one hundred thousand children had been tested and they expected soon to finish testing the children in every school in Manhattan and the Bronx. Among all these tests and infections he had not seen one case of infection. In order to bring about an immune child population it was necessary to begin early and to immunize all children from one to five years of age, inasmuch as eighty-five per cent. of the cases of diphtheria occurred among this group. The injection of toxin antitoxin in the newborn brought about very little immunity; the injections were effective, however, after the child reached the age of six months.

SYMPOSIUM ON FUNCTIONAL TESTS AND THEIR SIGNIFICANCE.

Circulatory.—Dr. William W. Herrick, of New York, recalled the fact that tried in the fire of experience in sifting out the unfit among the United States recruits in the recent war, the exercise test was not found wanting. Its simplicity and lack of requirement of apparatus made it most desirable. The pulse rate was counted after the subject had been quietly seated for a few minutes. Then a measured amount of work was performed, depending upon the safe capacity of the individual. The work performed should make a genuine demand upon the subject's capability. The pulse rate was counted immediately after exercise and again after two minutes rest. In the absence of disease of the lungs or gross pathology elsewhere or of fatigue the pulse rate in the young individual in good physical trim after a hundred hops should not be accelerated more than twenty beats a minute, and should, within two minutes after stopping exercise, be within five or ten beats of the previous resting rate. Dyspnea should not be marked. Modified to meet the individual needs of the patient or physician this test was the most practical of all for the practitioner. The ideal test for circulatory function should take account of all possible factors. It should include the resting pulse rate, the standing pulse rate, the rate after exercise and after a change of posture; such respiratory factors as the vital capacity, the minute volume of pulmonary ventilation, the pressure gradient of carbon dioxide in the blood entering and leaving the lungs, the basal metabolism rate, the electrocardiogram; all this in addition to the time tested physical examination and history. With all this data complete we should be nearer but not at the goal. Should a higher degree of precision be desired, Schneider's system is to be recommended. The more factors that are taken into account the better; always, however, one strove for the unattainable, a thoroughly reliable test of circulatory efficiency.

Renal.—Dr. John R. Williams, of Rochester, stated that the most valuable methods of determining renal function were those developed largely by Mosenthal of determining the specific gravity and fixation of the specific gravity, and those of Myer, Fine and Chase for investigating the blood chemistry. The phenolphthalein test had a limited degree of usefulness, but none of these tests by itself was sufficient. Judgment of the patency of the kidney must rest on a study of the patient himself, modified by the renal findings. A single test of renal function was of limited value. The phenolphthalein test, Dr. Williams said he no longer used, owing to its wide limit of error. A high blood urea was of very serious significance. Patients with a blood urea of two hundred mg. or approaching that point did not live long. Blood creatinin as high as six mg. was of very serious significance. With a blood creatinin of between three and six mg. a patient might live about a year. One test alone, whether made once or several times, was not nearly as valuable as a combination of tests. It was advisable to make all the functional renal tests and then follow those which gave the most significant leads. A combined marked fixation of specific gravity with hypertension was a serious portent. The individual with hypertension but without marked fixation of specific gravity could live along for years. An individual with low urea and marked fixation of specific gravity might go along quite a while. A marked fixation of specific gravity and high blood urea gave a very bad prognosis. Even with severe hypertension, if the urea remained low and the creatinin remained low the patients did well, if at the same time there was a normal specific gravity, but when the fixation of specific gravity, or urea or creatinin went up the outlook became serious. The reason for calling attention to these conditions was because some of them could be averted and others could be alleviated. Patients with hypertension and albumin in the urine had a serious outlook. A fact to be emphasized was that if an individual manifested kidney disease in such a manner that destruction or degeneration took place slowly so that the unaffected cells might compensate, the patient might go along for years. If the process came on rapidly and the opportunity for developing compensation was not very good serious phenomena might be precipitated. The best way to make functional tests was under the conditions in which the patient lived at home as suggested by Mosenthal. While urea and creatinin were of great importance, uric acid was not so important. Repeated functional tests together with the physical and blood pressure findings would enable one to form a judgment not only in regard to prognosis but also as a guide to the best method of treatment.

Gastrointestinal.—Dr. Abraham A. Aaron, of Buffalo, reviewed the findings in a series of eighty-five cases, normal and pathological, tested by fractional and single meals. In summarizing he stated that gastric subacidity was characterized by a low total and a free acid, rapidly emptying stomach, rapid disappearance of starch from the contents, and small amount of contents secured by aspiration. Achylia gastrica was characterized by a total acidity rarely over ten, absence of free hydrochloric acid, absence of pepsin, rapid disappearance of starch, and small amount secured by aspiration. Hyperacidity was characterized by a high acid value, large amounts, food retention, due to associated pylorospasm and separation of the contents into three layers. Pyloric obstruction due to ulcer, cicatricial tissue or extragastric pressure was characterized by high acid values, large amounts of contents, food retention, and three layer phenomenon. Carcinoma, nonobstructive, was usually characterized by subacidity, small amount, rapid starch disappearance and rapid emptying stomach. Carcinoma of the obstructive type was characterized usually by subacidity of achlorhydria, large amount, food retention, and three layer phenomenon. At the present time the fractional analysis had considerable distinctive value, but the single test meal was more easily and rapidly performed, rendering valuable diagnostic facts, for which reason, it must not be too hastily set aside or belittled. The fractional test was of outstanding value in determining a true achylia or subacid condition, and the actual emptying time of the viscus. From the findings in the eighty-five cases tested by fractional and single meals it might be stated that the single test meal was still of considerable value diagnostically and more easily performed than the fractional. There was a group of cases in which the fractional test was annoying, causing retching, duodenal regurgitation and salivation.

Transfusion of Blood of Immunized Donors in Bacteriemia.—Dr. LESTER J. UNGER, of New York, stated that the transfusion of unmodified blood was of far greater value than blood modified by the addition of sodium citrate. Sodium citrate, even in low percentages, affected the red blood cells, rendering them more fragile; diminished the available quantity of complement; reduced almost to nothing the function of opsonins, and practically destroyed the phagocytic power of white blood cells. Since the complement and phagocytic power were of prime importance in the protective action against pathogenic organisms, unmodified blood from a donor with high phagocytic index should be employed when attempting to combat local or general infections by means of transfusion. Dr. Unger described the work he had been doing in the endeavor to enhance the value of the donor's blood by producing immunity to the organisms causing bacteriemia in the patient. An autogenous vaccine was prepared from the patient's blood and the donor was treated with this vaccine, starting with one hundred million killed bacteria and giving daily injections of the vaccines in increasing doses up to one hundred to one hundred and fifty billion. Immunization was usually produced by the end of nine or ten days. Agglutination tests should be carried out to establish the fact that the donor had developed immune bodies before the transfusion was given. If a serious case required immediate transfusion whole blood should be employed and following this the donor should be immunized. A comparison of results in cases suffering from bacteriemia when treated with unmodified blood and when treated with the blood of immunized donors was decidedly in favor of the latter method.

Possible Clinical Significance of the Thyroid Suprarenal Cortex Interrelationship.—Dr. DAVID MARINE and Dr. EMIL J. BAUMANN, of New York, stated that the clinical manifestations of very acute cases of exophthalmic goitre were almost identical with the clinical manifestations produced in rabbits by sufficient suppression of the cortical function. This made possible a new conception of exophthalmic goitre. If the cortex could accelerate and inhibit thyroid activity, one must suppose that it was interrelated with many other gland activities in a similar manner, and there was abundant evidence that this was the case. During the last three years, in collaboration with Dr. Shapiro, the writers had been feeding fresh and dried suprarenal cortex to selected typical cases of exophthalmic goitre at Montefiore Hospital. Very encouraging results had been obtained in a small group fed with fresh cortex, while little or no improvement had been noted from the administration of the dried commercial preparations or those prepared by themselves. This therapeutic measure was one which deserved more extensive trial and study, and if found beneficial, attempts would be made to isolate, or, at least, concentrate the active substance.

Acute Anaphylactic Reactions Following the Intravenous Injection of Arsphenamine.—Dr. BURTON P. THOM, of New York, asserted that the hypersensitiveness to organic arsenic in some patients and its absence in others could only be explained on the ground of idiosyncrasy. The possibility of shock following the intravenous injection of arsphenamine or any of its congeners, while of rare occurrence, yet because of its sometimes fatal outcome and the fact that its occurrence was always unexpected and could not be presaged, must always be considered. We knew that arsphenamine in itself possessed hemolytic power and that this hemolytic power was enhanced by using plain water or a saline solution that was hypotonic, or by improper use of the neutralizing agent, sodium hydroxide. If arsphenamine was to be given the solution should always be isotonic. The water from which this isotonic solution was prepared should be doubly distilled and fresh; it should not be more than four hours old when used. The sodium hydroxide solution should be of known strength and also freshly prepared. A sodium hydroxide solution that had been kept indefinitely should not be used. Neutralization should be exact—not guessed at. In preparing the solution it should not be too vigorously shaken for too long a time, since its toxicity was much increased thereby. A concentrated solution of arsphenamine should never be given. A dose of six tenths gm. arsphenamine should never be given in less than one hundred and eighty c. c. of water. Personally, the writer preferred neoarsphenamine to arsphenamine. It was simpler to prepare and thus the chances of error were reduced to an irreducible minimum. It could be given in concentrated solution. He preferred to give nine tenths gm. in thirty c. c. of water—the dilution of Thiberge.

More Common Forms of Nervous Disease.—Dr. EDWARD LIVINGSTON HUNT, of New York, stated that epidemic encephalitis, multiple sclerosis and syphilis of the central nervous system should be considered the three principal nervous diseases. Epidemic encephalitis attacked most frequently the young and strong, affecting the small round cells about the smaller bloodvessels and the lymph and nerve cells and destroyed the nerve cells. As a result the symptoms were many and variable depending upon the locality in which the nerve cells were affected. There were four cardinal symptoms, namely, ocular paralyses, lethargy, elevation of temperature and changes in the general state. There might be, in addition, rigidity, depression and tremor. Among the aftereffects one might find the Parkinsonian syndrome like that seen in paralysis agitans. In fact, this syndrome as seen in paralysis agitans and following epidemic encephalitis was identical.

From this it seemed fair to assume that the Parkinsonian syndrome should not be regarded as an entity but merely as a symptom resulting either from a toxic cause or from bacterial invasion. If this syndrome followed epidemic encephalitis, might it not follow other acute infections which were known to affect the central nervous system? The condition was sometimes greatly relieved by the application of the actual cautery. Chorea was a word used to designate involvement of the central nervous system and was suggestive of many conditions. The Sydenham type was most frequently due to toxic conditions or infection. Any cause of reflex irritation must be sought for and removed, errors of diet must be corrected, the patient must be isolated and complete rest enforced. Arsenic administered intravenously was valuable in a few cases. The bromides had the disadvantage that they tended to depress the patient.

Coming to the subject of neurosyphilis, Dr. Hunt described the different types of affections of the central nervous system due to syphilitic infection. In making a diagnosis of a neurological condition syphilis should be placed at the head, and one should never reach a definite conclusion until syphilis had been excluded. It should also be borne in mind that syphilis was a constitutional disease and that the nervous system was affected very early. Many believed that the spinal fluid was involved a few weeks after infection. The treatment of neurosyphilis should be intravenous or intraspinous. When the intraspinous treatment could be avoided he thought it best to do so. One should administer salvarsan on one day of the week and mercury on another day. Silver salvarsan had been tried but Dr. Hunt could not say that the results were better than from the arsenical preparation. He felt that in most instances in which salvarsan was not tolerated it was due to the fact that the dose was too large or there was a mistake in the technic. It was well to remember that the reaction to the Wassermann test might be different at different times. As patients with neurosyphilis advanced in life Nature seemed to set up an immunity against the syphilic virus.

Open Air School for Children.—Dr. CLARENCE A. GREENLEAF, of Olean, expressed the belief that the public servants (school medical inspectors, health officers, etc.) were not fulfilling their duty unless they utilized every possible service of assistance to accomplish results. Public servants of the classes referred to above should get what assistance they could from the American Red Cross, the antituberculosis societies and similar agencies, and should stimulate interest among all classes in their efforts. In Olean, a city of over 21,000 people with the usual charitable institutions but no open air nutritional work, an active and well financed antituberculosis society was willing to build, equip and maintain an open air school. The new building included a complete kitchenette, and since this school was opened last September the pubils had been given a morning and afternoon diet (milk with crackers or bread and butter) and a well balanced noon meal. The statistics presented furnished abundant evidence of the value of this plan in combatting undernutrition among school children.

Heart Disease and Pregnancy.—Dr. HAROLD E. B. PARDEE, of New York, recalled that we had been told that mitral stenosis was a most dangerous lesion, and that the presence of aortic regurgitation was of very serious moment, yet one often saw patients with either or both of these lesions who had gone through one or more pregnancies without any untoward event. It was also true that some patients with these lesions who had more or less marked symptoms of cardiac insufficiency during their pregnancy manifested edema of the lungs during labor, and many of these died. The problem was fundamentally difficult. The only way to find a solution of the problem was to see a considerable number of women with heart disease either before they became pregnant or in the early months, and to follow them through pregnancy and labor to see how they withstood the strain. It had been possible to do this at the Lying-in Hospital. From this experience it seemed that the sole reason for the bed repute of mitral stenosis lay in its frequency. At the Lying-In Hospital it was found to be twice as frequent as aortic regurgitation, and so one would find twice as many mitral cases causing trouble as he did aortic cases if the two were of equal severity.

They did not find this proportion among their seriously sick patients, there being about an equal number with each of these lesions. The only guide from the heart's pathology which they had been able to deduce from their experience was a belief in the relative harmlessness of uncomplicated mitral regurgitation, whether with a slight or a greater degree of enlargement of the heart. All their patients who had this condition were well compensated throughout pregnancy and labor. If, however, one of these patients should fall in Group III or in Group IV of the classification adopted by the Association of Cardiac Clinics of New York—a coincidence which they had not encountered—he should not feel that they were any safer than other patients of those groups. By combining the patient's symptoms after her ordinary exertions and her reaction to the exercise tests they had been able to place all patients in one of four categories which followed the general principles of the classification of the New York Association of Cardiac Clinics. They had found this grouping very useful in prognosis.

It had also been a help in the management of pregnancy to know that Group III or Group IV women must be carefully watched, because only about half of them would go through labor without a dangerous degree of cardiac overstrain. Women of these two groups should be allowed to undertake pregnancy only when there was some special reason for having a child or when they were ready to keep themselves under the constant observation of a physician who was accustomed to handling such cases. With proper management of these severe cases it should be possible to allow any woman with cardiac disease to try to have a baby and to feel that the risk she took was not inordinately great. The exercise test should give one some degree of help in determining those who would go through safely, but their results in following the course of patients showed that it was not an infallible guide.

(*To be continued.*)

NEW YORK PSYCHIATRICAL SOCIETY.

Regular Meeting Held at the New York Academy of Medicine, December 7, 1921.

The President, Dr. THOMAS W. SALMON, in the Chair.

A Contribution to the Etiology of Feeblemindedness, with Special Reference to Enamel Defects.—This paper by Dr. L. PIERCE CLARK and Dr. CHARLES E. ATWOOD is published in this issue of the JOURNAL, page 573.

DISCUSSION.

Dr. CHARLES STOCKARD, in opening the discussion, said in effect that arrests in development of the embryo occurred at a critical moment in gestation. This critical moment corresponded to that of gravulation. Amniotic adhesions do not seem to be causal. Each organ has its own developmental dominant period. In experiments by Tandler of Vienna it was found that in twins comprising a male and female that the male testicle hormone of the calf affected the ovary of the female, arresting the ovarian development. The effect of vitamines must be considered of importance though as yet only partially worked out. A late opinion of some embryologists is that the skeleton is formed from the ectoderm. This has not been proved. In conclusion Dr. Stockard stated that in his opinion the experimental evidence is against the genetic origin of deviating types and in favor of accidental organic origin.

Dr. FRANKWOOD E. WILLIAMS, in his discussion, spoke of the importance of the subject on account of legislation being enacted from the viewpoint of the hereditary idea of origin.

Dr. FREDERICK TILNEY remarked that it was impossible to arrive at exact hereditary factors; that it was marvellous that the nervous system reached a normal development in any case. Endocrine factors must enter in. The embryo itself was a large gland of internal secretions. These endocrine organs, however, were not active until greater maturity.

Dr. CHARLES B. DAVENPORT wished to emphasize the fact that mental defect or feeblemindedness was not a biological concept, but a legal or social one. No doubt mentally defective children might arise from quite a number of unrelated causes. Goddard, in about seventy per cent. of feebleminded children, found evidence of a somewhat similar defect in close blood relatives. The speaker suggested another hypothesis of the origin of feeblemindedness which had not been sufficiently stressed. Studies made upon the uterus of pregnant pigs showed that only a certain proportion of the eggs that were ovulated developed to full term. Embryos died all along the line at various ages. Stillbirths which were found in pigs and sheep represented the embryos that died toward the end of the period. These earlier embryos were not miscarried immediately upon death; they were largely absorbed. Death seemed not due to faulty implantation—such a possibility hardly holds in the case of pigs and sheep. It seemed due to a lack of some of the developmental factors, probably of factors responsible for essential viscera. Just as many of the embryos that were started were incapable of complete development and thus died before birth, so others had only sufficient developmental impulse to carry them to the age of a few weeks after birth, or it may be to one, two, five or ten years. Thus we had the phenomenon of amaurotic family idiocy in which the child usually died before it was a year old. In the skeletal sphere we had the achondroplasias. Similarly we had certain muscular dystrophies. Inasmuch as these defects were not incompatible with life, the person might continue to live as a physical or mental defective, and was defective by virtue of the absence of the full equipment of developmental factors. These developmental factors that were lacking might be specific and unique, or there might be several of them.

If the defects were gross, as in many cases of infantilism, then, though the individual would survive, his defectiveness was eliminated in his strain as he was sterile. Thus a selective elimination of the physically and nervously incomplete was taking place from the moment of fertilization of the egg to maturity. In the case of those who were not so defective but what they could reproduce themselves, the developmental defects they showed were apt to be also shown in some of their descendants.

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Letters to the Editors.

THE OLD AND THE NEW.

NEW YORK, *May 3, 1922.*

To the Editor:

In reading medical magazines, reports from the New York Academy of Medicine and papers read before national associations, the old practitioner finds there is little he really cares to read.

It is almost always detailed accounts of curious or rare cases, with the added refined laboratory findings. But to any further or better knowledge of how to treat ordinary diseases, it is woefully lacking. Is this desirable and a sign of true and real advance in medicine? I can not and do not believe it is. Above all, medicine should be a practical art, based upon long experience, knowledge, conscience, self-sacrifice. The science, socalled, varies much with every succeeding decade. Things and methods, which have been proven to be useful and, so far as possible, remedial in the special case, as manifested, and as like preceding ones as cases ever are in reality, should never be ignored or given up for what is merely the result of research work, usually of passing value.

Nearly all men who have studied and practised in large centres of population have had their apprenticeship in the use of mechanical instruments. And because these change and become more perfected they must never be allowed to take the far more important rôle of the instructed brain, which has dealt time and again with the advent, progress and outcome of many ailments and patients with them, through a score and more of almost continuous night and day watches.

I hope and pray, my juniors may wisely consider the foregoing brief remarks and have their conduct in the treatment of those who are ill, and frequently in pain, guided by them.

BEVERLEY ROBINSON, M. D.

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NEW YORK, WEDNESDAY, MAY 17, 1922.

Miscellany.

A Review of Three Hundred Cases of Blood Chemistry.—Edward B. Bigelow (*Boston Medical and Surgical Journal,* May 5, 1921) concludes from a review of the blood chemistry in this series of three hundred patients that in general these examinations, whether they prove to be normal or abnormal, are functional tests of value in the fuller consideration of cases. Prognosis is extremely poor when there is a high retention of creatinine, and rather poor when a high urea retention. The determination of the alkali reserve is valuable in diabetes mellitus and to a lesser degree in nephritis. Repeated blood sugar determinations are invaluable as guides in the treatment of diabetes mellitus.

Arthritis.—R. Pemberton (*Military Surgeon,* December, 1921) summarizes that the conclusion can be justifiably emphasized, as revealed by observation and study in the United States forces, that arthritis presents a problem of military and social importance not hitherto appreciated. In view of the considerable data bearing upon this problem, failure to anticipate and provide for it in the event of another emergency would result in a largely avoidable and important reduction of military strength. A further result would be a long-continued after burden upon the civil community, to say nothing of the element of personal suffering entailed. It is suggested that the available data would form the basis of a skeleton plan of organization directed towards prevention of the disease, treatment of it and investigation of its nature. Consideration of treatment should include centres for this purpose, their location, equipment and personnel; and investigative effort should be on a scale commensurate with the increasing necessity for solving this problem and the unusual opportunities to this end created by war conditions.

Formation of Hemolysin Following Splenectomy.—St. Weiss and E. Stern (*Wiener klinische Wochenschrift,* February 9, 1922) report that in a series of experiments with injections of heterogeneous blood no difference was observed in the formation of hemolysin in the operated and control animals. The hemolysin content of the splenectomize animals was less than that of the control rabbit and whereas the controls contained considerable amounts of hemolysin on the sixth day after the first injection, the hemolysin formation appeared in most of the cases only after the second injection in the splenectomized rabbits. The increase of the amount of hemolysin was similar in both. The spleen undoubtedly plays an important part in the formation of these antibodies.

Remarkable Course of a Tuberculous Spondylitis. — Hans Wimberger (*Wiener klinische Wochenschrift,* February 2, 1922) reports the case of a boy fourteen years old, who showed nothing unusual but an irregularly shaped outline in the region of the lumbar vertebræ and a poor general condition. The röntgenogram showed a calcified gravitation abscess in the region of the last thoracic vertebra which was markedly destroyed and of the two upper lumbar vertebræ. The two remarkable features of this case are the rarity of a röntgenogram of a calcified spondylitic gravitation abscess and a spondylitis with severe destruction of the thoracic and lumbar vertebræ, which were healed without any special deformities and without affecting the gait. A complete clinical cure resulted from heliotherapy.

Principles of Cancerous Disease.—Alexander Fraenkel (*Wiener klinische Wochenschrift,* February 2 and 9, 1922) asserts that every noxa may produce carcinoma to a greater or less degree, but not every part of the body is suitable for its development; both the exogenic and the endogenic factors deserve consideration. For some cases, as in branchiogenic tumors and nevus carcinomas, Cohnheim's embryonal theory is the proper explanation, and in others Fischer's theory, that the end of the development and loss of the embryonal power of development are not identical, holds good. The stimulation from abnormal growth attacks the cells directly or indirectly through the organism. In regard to heredity, neoplasms behave like malformations (Rössle), but statisticians are not convinced of the heredity of carcinomas: it seems that a certain predisposition for the origin of carcinoma is necessary and that this predisposition is favored by the complete behavior of the organism and can be hereditary; carcinoma, as such, is not hereditary. Where carcinomas occur in certain regions, parasites must be considered. Carcinomas do not occur in invertebrate animals; the human stomach, rectum and uterus frequently manifest them, whereas the duodenum and ileum rarely show them; herbivora show carcinomas most frequently in the respiratory tract. Some authors connect the functional activity up with the cancerous development, but this, just like the relationship between parasitism and the development of carcinoma, is only hypothetical. Investigations in immunity have up to the present time not solved the problem.

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Malignancies of the Colon*

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Feeling that a consideration of our work in this field at the Post-Graduate Hospital and Medical School added to the work done in several outside hospitals would be of more practical benefit than a theoretical paper, we present a study of 129 cases which came under our operative care in a service covering the past six years. Of this number, fifteen were inoperable from the viewpoint of metastasis to other organs, and nine were inoperable from the viewpoint of extensive regional metastasis. The remaining 105 patients were operated upon according to some one of the various types of palliative or radical methods, which will be considered later.

Malignancies of the colon have been observed over fifty per cent. more frequently during these six years than malignancies of the stomach. During this period carcinoma of the stomach (in the Post-Graduate Hospital) was seen in seventy patients, while carcinoma of the colon was found in ninety-six patients in the same service. These figures bear no positive relationship to the frequency or excess of the colonic cases but present a fair indication of colonic malignancies. The sites of frequent occurrence are considered under the regional classification in the order of frequency found in the cases considered in this article:

CLASSIFICATION OF SITES OF FREQUENT OCCURRENCE.

1. In the inferior division of the inferior mesenteric divisions, that portion of the gut from the anus to the sigmoid, including the socalled sigmoidorectal junction—a series of fifty out of the total of one hundred and twenty-nine.
2. In the superior division of the inferior mesenteric, or the sigmoid zone proper, a series of thirty-seven out of the total of one hundred and twenty-nine.
3. The ileocolic region or the cecum and the terminal ileum, presents a record of eighteen out of the one hundred and twenty-nine.
4. The midcolic region—considering this area to include the upper half of the ascending colon, the hepatic flexure and the proximal half of the transverse colon, presents fifteen out of one hundred and twenty-nine.
5. The distal colic region, including the distal half of the transverse colon and the descending colon, sums up nine patients.

The regional frequencies present food for thought as to the etiological factors so frequently given as stasis irritation. The anal types—those involving the lowest segment of the rectum and the sphincter—were seen quite frequently in the first list. They have been and are still the source of great speculation as to causation beyond that of the mucocutaneous margin theories.

AGE AND SEX OF PATIENTS.

A series of eighty-six patients under observation at the Post-Graduate Hospital were rather equally divided between the sexes, forty-six being males and forty females. But a marked difference in sex preponderance occurs in the female in cancer of the lowest segment. In the sigmoid, there were ten more males than females, while in the rectosigmoid and rectoanal there were ten more females than males. The average age of patients operated upon was forty-nine and one fifth years, the youngest being a female twenty-two years of age and the oldest a female of eighty-nine.

RAPIDITY OF GROWTH.

The rapidity of growth in these patients is influenced as in cancer in other parts of the body, i. e.,

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by the age of the patient and the type of the cell. The more youthful the patient, the more rapid the growth. The lapse of time between the initial cell change into carcinoma and the date of operation cannot be estimated, as all calculations must be based upon and reckoned from the appearance of the first symptom, either subjective or objective; and unfortunately often the first symptom is objective—such as evidence of blood or mucus in the stool.

MULTIPLE GROWTHS.

Multiple growths in the colon have not been encountered in this series, although I have seen them in other patients considered in an earlier contribution. A rather unusual instance occurred in this series. One of the patients had had a typical Friedreich's operation done by me for a carcinoma of the appendix, with cecal contiguity and continuity growth, three years ago, and during the past eight months suffered a complete obstruction, due to a growth in the sigmoid. It may well be speculated that this patient had the sigmoid growth at the time of his first operation, or that he had a metastasis (unusual) in the sigmoid from the appendix growth. It was true that he had been submitted to an exploratory appendix operation one year before I saw him, and that his diseased appendix for some unknown reason was not removed.

SYMPTOMATOLOGY.

From the viewpoint of regional classification the symptoms should vary somewhat, but in the main they are prone to slight variation. It is a well observed fact that in growths involving the cecum and the iliocecal region obstruction is a rarity, due to the liquid state of the contents of the small intestine. No acute ileus was observed in any of our patients suffering from a growth in this zone. It is a well known fact that growths of the cecal zone are early associated with marked anemia. It is also observable that tumors of the cecum are palpable as a rule late in the process of the disease and that the x ray is not conclusive as early as in growths in the distal half of the colon.

These patients complain of a feeling of distress, soreness and pressure at this site. In fact, this is so to such a degree that quite frequently an appendicitis of the recurring variety is not only suspected, but the patients have been operated upon for such a disease, the true state of affairs in five of the patients coming to me having been overlooked by the original operators.

Colic in this area is evidenced only when the growth involves the ileocecal valve area to such a degree as to become occlusive or when the growth occupies the distal portion of the caput to such a degree as to become obstructive. As the disease progresses in the distal portion of the colon, cramps or colics become more and more evident. This is essentially due not to the invasion of the lumen of the gut so much as to the difference in the fecal consistency. The more solid the content the more prone to plugging is the lumen—the more liquid the content, the smaller the lumen may be without producing a colic or obstruction.

Toxemias are seen more often in the obstruction of the distal half, due to the proximal deflection of the fecal current, the growth of the intestinal bacteria and their absorption, due to the obstructive stases. Borborygmus is a frequent evidence, especially when obstruction becomes evident.

I have been laying a great deal of stress on the succussion sound in the cecal zone in various types of obstruction in the colon. This sound is made by the liquid contents of the cecum distending the caput and the gas that of a necessity is forced into this portion of the intestinal tract. This succussion or splashing sound indicates an early operation.

PAIN AS A SYMPTOM.

Occasionally there are sciatic, lumbar and perineal pains due to nerve involvements by the descending colon, sigmoid and rectosigmoidal growths, in addition to the general signs and symptoms. Tenesmus is one of the early symptoms to which the patient's attention is called in the lower distal or sigmoid and rectal involvements. Pain in the back, unfinished sense after defecation, blood or mucus, or both, the loss of ambition, loss of weight and the sallow cachectic countenance, are distinct symptoms. In the rectoanal region with or without infiltration or ulcer we frequently have complete sphincter failure. The occurrence of perforation is not to be underrated. When there is a sharp pain in the lower left quadrant, without emaciation or a fairly long history of tenesmus or bloody or mucous stool, the inference is one tending to a perforating diverticulitis, rather than a perforated malignancy. There were three patients in the series of one hundred and twenty-nine in whom perforated malignancies were found. Each of these had a sigmoid growth.

METHODS OF TREATMENT.

Treatment of these growths today resolves itself into the radical surgical procedure in the proximal three fourths of the colon; and the question of radical operation versus radium with or without excision comes up. These methods I shall discuss later.

PREOPERATIVE TREATMENT.

As a preliminary to operation in this class of patients when possible preoperative treatment of thorough intestinal cleansing should be instituted. This consists of intestinal drainage when the growth is not obstructive, or establishing an artificial anus in some portion of the intestine proximal to the growth. This site is a matter of choice to the operator, but for years my selection has been the cecum in preference to the other segments of the colon, because in all growths distal to the cecum, this position of the artificial anus is remote from the field of the final operation and does not interfere by newly formed adhesions nor by soiling; and, finally, it is easy to close after its function has been terminated. The cleansing of the distal bowel through a cecostomy is readily performed by irrigations after the cecostomy is old enough—two to four days—to prevent leakage into the peritoneal cavity. It is gratifying to observe with what facility the rectal tube can be introduced into the colon through the cecostomy wound during the period of irrigation. A reverse peristalsis takes place readily during this period. During the time of the functionating artificial anus and before the radical operation is performed, careful attention must be given to the renal functioning and nutrition.

RADICAL TREATMENT.

Under the heading of radical procedure one must consider the formation of a permanent artificial anus and the removal of the growth, with repair of the divided ends of the gut. Artificial anus as a temporary expedient has already been discussed, but as a permanent objective several important pathological features must be considered. A permanent artificial anus is to be made only in those patients in whom we find the growth so firmly fixed to surrounding structures that removal would end disastrously, or in patients in whom the contiguous and remote metastases are so extensive as to predicate an early demise with or without operative procedure. In this latter type with remote metastases, as in the liver, I have been doing the radical resection with anastomosis because a permanent artificial anus does not cause the metastases to subside, and because patients with an artificial anus in this variety of pathology, living for a period of from a few months to the best part of two to three years with all the disagreeable associations of an artificial anus, could have had all the discomforts allayed or abolished by an additional risk of a small percentage. I have been very pleased with my results in this type of operation, during the past five or six years.

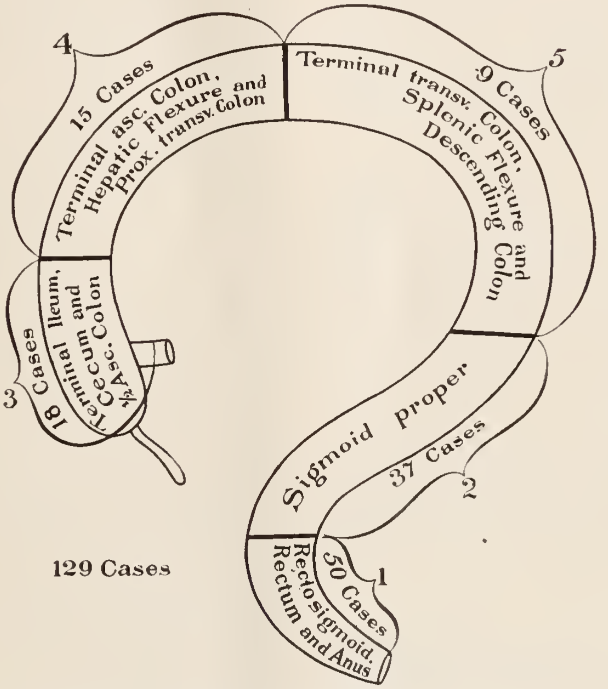
4
15 Cases
Terminal asc. Colon, Hepatic Flexure and Prox. transv. Colon
Terminal transv. Colon, Splenic Flexure and Descending Colon
9 Cases
5
3
18 Cases
Terminal Ileum, Cecum and Asc. Colon
Sigmoid proper
37 Cases
2
50 Cases
Rectosigmoid, Rectum and Anus
1
129 Cases

Fig. 1.—Diagram showing regional classification of the sites of colon malignancies in the 129 cases which came under Dr. Erdmann's care in the Post-Graduate Hospital.

In the permanent artificial anus patients two methods of procedure as to the growth are to be followed. In the first instance the growth is allowed to remain, while in the second the growth is removed with all the surrounding tissue. The growth is left in those cases in which we find the infiltration extending beyond the possibility of total removal. Therefore, rather than to excite a mushroom activity, the distal segment, after the proper preparation, is dropped into the abdomen and the proximal end is sewed into the abdominal wall; or, as in the lower sigmoid growths, one may leave the doublebarrelled anus so that radium may be applied directly from above and below through the upper and lower stomas of the bowel. In the event that the growth is removable (this applies of course to the lowest segment), the lower portion is liberated from the sacral groove. Then a perineal approach is made to liberate this portion, the whole segment with the growth being delivered through the perineal incision.

In the event of a nonremovable growth in portions of the colon proximal to the sigmoidorectal zone, short circuiting by means of a colonic or ileal byway is in order. This prevents an early total obstruction or a series of periods of partial obstruction.

METHODS OF ANASTOMOSIS.

As to the question of the method of anastomosis, end to end, side to side, or end to side, by suture or mechanical appliance, one must judge his own capacity for the type he will select. The advance in ability to suture without leakage in the great majority of instances, the ability to do fairly rapid work, and the improved qualities of catgut now upon the market, place the Murphy button in the discard.

I have been doing the majority of my anastomoses during the past few years by the end to end method, doing a plastic on the smaller calibre end to meet with the larger end, except in those instances where the gut is friable from edema. In these a side to side is as a rule successful. Nor do I fear the hypothetical pocketing in doing a side to side anastomosis, because I always make the opening to extend to within one half inch of the inverted ends. I have had no more leakages in my end to end anastomoses than in the side to side, or end to side. Of course there are occasions where one feels that a few minutes saved by doing a side to side will be advantageous. More and more frequently I am doing resections with direct anastomosis in those patients having sigmoid rectal junction growths, thereby preserving the sphincteric functions, while formerly, owing to my difficulty with this type, I was accustomed to resect and transplant either anteriorly or posteriorly.

The operation of Mikulicz is quite amenable to the growths from the cecum to the rectosigmoid junction. It has been performed by me, however, but ten times in the entire series. While it does seem by statistics to be a safer operation than an immediate end to end or side, etc., I question it from my personal experience, and object to the operation as being one of three to four times the duration of the suture method. Our actual periods are Mikulicz average time in hospital ten weeks, while that of suture anastomosis was four weeks.

In regard to the implantation of the bowel in the perineum or high coccygeal or sacral zone, I find less and less objection to this procedure from my personal viewpoint. As a result of observation in quite a number of such operative cases, I have been forcibly struck with the control, often better than before the operation, and also by the ease with which these victims preserve cleanliness. Also there is to the patient himself or herself a great deal less of disgust.

It is customary to have an artificial anus established for seven to fifteen days before doing the radical operation. This procedure is the cause of the loss of the toxemia existing at the time the patients first come under observation and permits of cleansing the bowel to the site of the growth, thereby facilitating the resection and preventing sepsis to a great degree. It also brings about the subsidence of the edema often seen in the proximal portions, and the subsidence of the marked distention—thereby bringing about a more normal diameter of the proximal end for anastomosis with the distal end. Finally, it is a safety vent during the repair of the suture line of anastomosis, by preventing distention with gas and feces, and by taking the weight of the column of feces from the site of anastomosis again prevents leakage to a great degree.

A very able device for anastomosis by the end to end method is the Balfour tube, with invagination of the anastomosis ring. This application acts as an artificial anus in addition to being an invaginator for the ring of anastomosis.

I am not strongly inclined to believe that a complete circle of peritoneum is necessary to prompt union, though admitting its usefulness in promoting repair, but believe that in anastomosing—say the sigmoidorectal zone or sigmoid, that the first essentials are the preservation of the muscular and mucous membrane circulation, the exclusion of all fat lobules, and the accurate approximation of the muscular and mucous coats.

Admitted that anastomosis in these zones is particularly prone to fecal fistula formation, then the most important step is the instituting of proper and competent drainage for a few days. In the anastomosis proximal to the sigmoidorectal zone, I prefer no drain except in the skin wound.

END RESULTS.

1. Extension of life with no foul discomforts, in those patients with existing metastasis in the liver at the time of operation, from eight to twenty-four months or more.

2. In those in whom no appreciable metastasis at remote zones are found, extension of life from months to years. In this series we have traced the greater number of patients and find that there are several of each variety living from one to six years.

The method of Mikulicz was done ten times, end to end anastomosis forty-five times and side to side anastomosis twelve times. The mortality during the past three years has been in marked contrast to that of the first three years—about five per cent. in the former as compared to fifteen to eighteen in the latter. A great deal of this lowering of the mortality is due I feel to the preliminary drainage by means of an artificial opening, and the care observed in placing this opening remote from the field of expected removal. This latter prevents undue adhesion work and soiling of the area by handling of an artificial anus when made in or close to the segment of gut to be excised. A goodly portion of the high mortality has also been due to the desperate condition in which some of the patients came to us as several died following the performance of an artificial anus even under local or gas anesthesia. This was due to the toxemia from obstruction absorption.

RADIUM AND X RAY TREATMENT.

I do not feel entitled to discuss this treatment, but have some very definite views as to their general inefficiency as a cure. The question of preoperative "sickening" the cell growth in patients when the growth can be reached is one of weight, well worth considering, although so far I cannot speak with the same fervor as do some of my confrères. Radium has its place at present in the treatment of growths in the rectum, but has again been rather disappointing to me in several instances of supposed cures, which relighted in from six to nine months with redoubled vigor, rapidly placing the patients beyond operative relief, while in the majority of patients its service has not only been negligible but, I am satisfied, deleterious.

AIDS IN DIAGNOSIS.

Aids in diagnosis that are of inestimable value are the proctoscope and the x ray. No patient who has pain in the lower back, perineal or sciatic distribution, who complains of distressing flatulence, tenesmus, or blood and mucus in the stool, should be allowed to leave the physician's observation before proctoscopic examination is made. No patient with abdominal colics, a sense of distress at any of the colonic flexures or throughout its course, nor in the event of a slow losing of weight, with or without evidence in the feces, should be dismissed from observation until a careful series of x ray plates is taken. These should be taken both from a barium or bismuth intake by mouth and by enema. When one suspects a malignancy or other variety of obstruction impending, it is advisable to take the x ray first by means of enema. On two occasions recently we have seen an acute obstruction instituted by the intake by mouth, due to the mass forming, rocklike character of the barium, causing a plug at the contracted lumen, necessitating thereby an emergency operation.

There are times when the greatly distended bowel will produce spasms of the appendix (appendicular colic). As a result of these misleading symptoms, appendectomies had been done in five instances in patients entering my service, which were followed in a few weeks to a number of weeks by a correct diagnosis and operative procedure.

60 West Fifty-second Street.

Occlusion of Intestines.—Davis and Poynter (*Surgery, Gynecology and Obstetrics,* January, 1922) state that congenital occlusion may occur at any point in the intestinal canal. In fifteen per cent. of this series it is multiple. The condition is relatively rare, it occurs once in about twenty thousand infants. There is no one cause for all of the cases. The various etiological factors may be summarized under the following heads: developmental anomalies, developmental accidents and fetal diseases. Prognosis is bad. Treatment should be an enteroanastomosis performed as early as possible.

Acute Intestinal Obstruction

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The wonderful strides made in medicine and surgery in the past two decades have resulted in a marked reduction of mortality in many conditions formerly considered invariably fatal. Nevertheless the hospital mortality in acute intestinal obstruction, even in the best hospitals in the world, has remained practically at a standstill. Except in a few series of cases, reported by surgeons who had seen their patients from the onset of symptoms and had operated upon them promptly with wonderfully good results, the mortality reported by most surgeons is over forty per cent. The mortality in obstruction from strangulated hernia, where the cause is more obvious, and which is not usually included in statistics of acute intestinal obstruction, is much lower, averaging today about twenty-five per cent. in hospital practice. Statistics from many different sources agree that the operative mortality in acute obstruction is comparatively low where operation is performed soon after the onset of symptoms, and increases rapidly as operation is delayed from day to day. For example, McKenty (10), in forty-three cases, with an average mortality of forty-four per cent., had an operative mortality of only eleven per cent. when the operation was performed in the first twenty-four hours after the onset of symptoms. In the twenty-four to forty-eight hour period it was twenty-two and two tenths per cent., in the forty-eight to seventy-two hour period fifty per cent., and after seventy-two hours, sixty-nine and two tenths per cent. Richardson (12), in a study of 118 cases of operation by twenty-three surgeons in the Massachusetts General Hospital, found a mortality of forty-one and five tenths per cent. in the series, thirty-two and five tenths per cent. in those patients operated upon in the first forty-eight hours after the onset of symptoms, and forty-eight and one tenth in those patients operated upon after forty-eight hours. The patients who recovered had had symptoms for an average of two and six tenths days before operation, those dying, for four and two tenths days.

Delay in seeking operative relief is therefore plainly the cause of the persistently high mortality. Moynihan has stated that anything over ten per cent. is the mortality of delay. This delay in operation is obviously caused by 1, the fact that patients are very apt to spend the first twenty-four or even forty-eight hours in selfmedication, thinking that their symptoms will be quickly relieved by purgation, enemas, hot water bags, etc.; 2, the inability on the part of the average medical man to make a sufficiently early diagnosis to give the patient the benefit of the low mortality attendant upon early operation. The first reason is one difficult to cope with, unless an educational campaign is carried out among the laity, perhaps in the same way that information regarding tuberculosis and cancer has been disseminated. The second reason may be due to several factors, namely, 1, to the relative infrequency of acute intestinal obstruction, so that the average practitioner sees but a few cases in years of busy practice; 2, to carelessness or inattention on the part of the physician in making light of the early symptoms of acute obstruction, and treating the case as one of constipation or of socalled ptomaine poisoning; 3, to the fact that even the careful, conscientious practitioner, when confronted with a case showing undoubted early obstructive symptoms, does not feel justified in advising surgical consultation, as he has been taught to feel that the cardinal symptoms of obstruction, as emphasized in all textbooks and lectures, are fecal vomiting, visible peristalsis, rapid pulse, Hippocratic facies, and collapse. Any symptoms short of these are held to be insufficient for a diagnosis, and yet it is a fact that cases presenting these symptoms are usually beyond hope of cure by any procedure known to science. The remedy lies in a free and frequent discussion of this subject in medical meetings and in medical publications, and in the correction of the misleading way in which the textbooks confuse early with late symptoms.

Cases of acute intestinal obstruction may be classified from the clinical viewpoint under two groups, namely: 1. The cases of acute obstruction following a more or less long continued period of abdominal or digestive symptoms, such as, a, cases of obstruction due to deformities, bands or adhesions, congenital, postoperative or tuberculous; b, acute obstruction following a gradual narrowing of the lumen of the bowel from pressure from without or protrusion or cicatrix from within, due to ulceration, diverticulosis, or new growth of the bowel; c, obstruction following a long continued gallbladder irritation, with the passage of a stone and finally intestinal impaction of the stone; d, obstruction from impaction of any other foreign body in the bowel lumen; e, obstruction from fecal impaction following a long continued period of constipation; f, paralysis of the bowel following operation or attendant upon an acute local or general peritonitis or acute pancreatitis. 2. The cases in which the acute obstructive symptoms come on suddenly, without previous symptoms, as in cases of volvulus, intussusception, internal hernia (as, for instance, through a Meckel's diverticulum), or mesenteric thrombosis.

In all types of case the essential pathological condition is the same—occlusion of the lumen of the intestine is the necessary condition. Interference with the circulation of the gut (strangulation) may be either a cause or an effect of the obstruction, and may result in gangrene, perforation, or peritonitis. The development of strangulation nearly doubles the mortality rate in acute obstruction, due not only to the peritonitis which supervenes, but to the serious operation of resection which is necessary where gangrene has occurred.

The cause of the poisoning and subsequent death resulting from acute intestinal obstruction, has not yet been satisfactorily explained. That the mere arrest of the onward passage of intestinal contents is not the essential cause has been shown by many investigators by the method of producing an isolated loop of intestine by tying off a section of gut above and below, and then reestablishing intestinal continuity around this loop by intestinal anastomosis. The symptoms produced by this procedure are the same as those following complete obstruction at the same level, leading to the conclusion that the symptoms are due to the absorption of toxic substances produced in the obstructed area. Dragstedt (6, 8, 9) and others have shown that these toxic substances are formed even if all secretions and food are carefully removed from the isolated loop before it is closed. The secretions removed before closure, or, in fact, the fresh secretions from any part of the intestinal tract, are not toxic, even when injected intravenously into animals. On standing, however, and thus permitting of bacterial growth in them, the intestinal contents later become markedly toxic. Davis and Stone also have shown that if isolated loops are allowed to drain, even into the peritoneal cavity, no untoward symptoms develop. Dragstedt and his coworkers found that if these loops were washed with sterile water and ether before closure, half of their dogs survived the operation, whereas without the washing all invariably died with toxic symptoms. That this was not entirely due to antiseptic action was proved by the fact that washing with stronger antiseptics than the ether and water mixture did not produce the same good results, and also by the fact that contents subsequently removed from the loop of recovered animals contained many bacteria and were fatal to animals into which they were injected. Single sterilization of a closed loop disclosed the presence of large numbers of bacteria within twenty-four hours. However, in a closed loop kept nearly sterile by constant injections of antiseptics there were no toxic symptoms even when the tissues of the loop went on to complete autolysis due to occlusion of the blood supply. That the astringent action of the ether was a factor in the recovery was shown by the fact that animals whose loops were washed with alum and tannic acid solutions before closure recovered in a small percentage of cases. It was found that dogs dying from a closed loop usually did so in from two to five days, with toxic symptoms developing in the last twenty-four hours to forty-eight hours. These dogs at autopsy invariably showed enormous distention of the loop, with necrotic areas, or perforation with peritonitis. Injection of magnesium sulphate into the loop of a recovered dog resulted in a marked distention of the loop due to osmosis and paresis, with death in three days. All these findings were the same whether the loop was in the colon or in the upper small intestine.

Dragstedt feels that a study of the facts brought out by the experiments briefly described above, together with the fact that animals have survived the removal of the duodenum, warrants the conclusion: 1, that it is impossible to sterilize the intestine by the use of chemical antiseptics, even when applied directly to the mucosa of isolated segments; 2, that, contrary to the opinion of Whipple and others, the mucosa of the alimentary tract does not elaborate an internal secretion necessary to life, nor a secretion disturbed by acute obstruction and producing a proteose accountable for the symptom complex of obstruction; 3, that the substances responsible for the toxemia in acute obstruction are produced by the action of *intestinal bacteria* on proteins or their endproducts; 4, that injury to the intestinal mucosa, especially that resulting from disturbance of the blood supply of the intestine, greatly facilitates the absorption of these substances.

Clinically, therefore, we must realize that when toxic symptoms begin to develop in a case of intestinal obstruction it means that the circulation of the gut has begun to be interfered with, and that the hope for successful operation is rapidly becoming more and more remote.

SYMPTOMS.

The symptoms of acute intestinal obstruction, which are almost invariably present from the beginning are: vomiting, constipation, and abdominal pain. The symptoms may begin suddenly without previous warning or may have been preceded by a long train of other symptoms or by more or less recent operation (appendectomy being most frequently the cause of this type).

The vomiting, in the beginning, is of the reflex type, due to pylorospasm, the spasm being an effort on the part of Nature to prevent any more material from reaching and distending the obstructed area. The vomiting is not relieved by lavage and may occur immediately after ingestion of food or drink, especially in high obstruction, or, in low obstruction, may occur later, when some of the food has begun to approach the obstructed area. In from two to four days, when the pylorus begins to play out and pylorospasm ceases as a protective measure, reverse peristalsis in the small intestine, probably all the way down to the ileocecal sphincter, and later actually to the point of obstruction, occurs. The vomiting becomes bile stained and then darker in color until fecal in character. By the time the vomitus becomes fecal the patient's condition is usually such that even most skilful surgery will result in a high mortality.

The constipation, in the beginning, is usually an unobtrusive symptom. The patient may remember having a good stool the day before, although more frequently there is a history of no stool for several days, with various measures taken to relieve the constipation. Enemas which in the beginning may have brought a slight fecal return, may return clear, and no flatus be expelled. If the obstruction is low down, only a very small amount of enema will be held by the rectum at one time (a pint or less), whereas in high obstruction (small intestine) enemas may pass easily into the whole colon and may for a day or two show some fecal return. In intussusception and carcinoma blood may occur in the washings and may be passed spontaneously.

The abdominal pain is usually a prominent symptom, although it may not always be severe. It is usually cramplike in character, occurs all over the abdomen, especially in the midabdomen, and its severer paroxysms are usually accompanied by vomiting (reflex), which, however, does not bring relief. The pain due to violent peristaltic contractions of the intestine above the obstruction, in an effort to force the contents past the point of occlusion, is aggravated at once by food and cathartics and not relieved by enemas. It is usually worse in the first few days after the obstruction, becoming gradually less severe as the intestinal musculature becomes tired out, although occasional violent spasms may occur even late in the disease. This peristaltic pain, so characteristic of obstruction, is usually succeeded later by the pain of distention or the very intense constricting pain of strangulation, when the patient's chances of recovery have become slim indeed.

The findings on examination are usually very indefinite. Of the signs so beautifully described in all the textbooks, tympany, visible peristalsis, shock and collapse, rapid pulse, palpable mass, and Hippocratic facies are much discussed. Tympany or distention is rare in the early stages of obstruction, having been found by McKenty in only seven per cent. of cases in the first twenty-four hours. It is usually a late symptom, and signifies that toxic absorption is taking place or that strangulation or peritonitis have occurred. Visible peristalsis, while a valuable diagnostic finding, is of rare occurrence except in postoperative cases, and is apt to be a late symptom.

Shock is rare at the onset of obstruction and usually when it occurs is an indication that a complication has occurred, that strangulation, perforation, or peritonitis has added its mortality rate to that of toxic absorption. Rapid pulse rarely occurs early, a rapid, feeble pulse and the general symptoms of collapse giving evidence of strangulation, gangrene, or peritonitis.

A palpable mass may occasionally be observed, as the abdomen is not usually rigid or distended until complications have developed. Carcinoma, impaction, and intussusception are the most frequent types of cases in which a mass can be felt. Rectal examination or proctoscopy may show a carcinoma or an intussusception. Hippocratic facies of course usually signifies impending death. The temperature may be normal or subnormal until peritonitis supervenes.

The laboratory findings in acute intestinal obstruction are usually and correctly confined to the more simple procedures, as the importance of early operation makes prolonged investigation undesirable.

Examination of the blood will show a moderate leucocytosis early in many cases, although marked leucocytosis does not occur until the later stages, when complications have developed.

The blood chemistry will show an increase in blood urea, due to the toxemia, but this increase must of necessity be also a later development, although an earlier one than that of a developing acidosis.

The urine will show slight concentration and in late stages may show evidence of toxic irritation of the kidneys or of acidosis.

Examination of the gastric contents is usually confined to examination of vomitus or of material obtained during lavage, and will show nothing characteristic until the late symptom of fecal vomiting occurs. Early, however, the vomiting may be differentiated from that of pyloric stenosis by the fact that the gastric contents contain no food eaten at a remote period, that is, more than six or eight hours before.

The stools, if any are obtained at beginning, may, if they contain blood in considerable amount, lead to a suspicion of carcinoma or of intussusception.

The x ray examination is usually not desirable or necessary, although in an early, doubtful case a gastric series would show beautifully the exact point of obstruction if the barium meal were not vomited before reaching that point. In most cases, however, a colon examination by means of an opaque enema can be done with little harm to the patient and may be of much value in determining the site of exploration in suspected colon carcinoma. A simple x ray without an opaque meal can also be made without danger even in severe cases, the gas often outlining the intestine and showing the point of obstruction beautifully.

The diagnosis of acute intestinal obstruction, as will be seen from a study of the facts brought out in this paper, should be based on the findings of: 1, peristaltic pain, increased by food or cathartics; 2, persistent vomiting, not lessened by lavage, and 3, constipation, unrelieved by enema. Early in a case in which there is a question whether the condition at hand is due to true intestinal obstruction or merely to simple fecal impaction, it is justifiable to give a softening oil enema (castor oil and olive oil, four ounces of each) to be retained, and a moderate dose of castor oil by mouth, followed in four to six hours by a soapsuds enema and possibly a hypodermic injection of pituitary extract. In simple impaction of paresis this course will usually bring results. If no evacuation occurs, or if the symptoms are aggravated, a diagnosis of obstruction should be considered fairly well established, and no further catharsis attempted. The early physical signs and laboratory findings, as stated before, are not of much diagnostic value, being definite signs occurring only late in the disease. It is unjustifiable for a clinician to wait for fecal vomiting to establish his diagnosis or to allow a patient to go into a state of collapse from obstruction and toxemia.

DIFFERENTIAL DIAGNOSIS.

The principal conditions from which acute intestinal obstruction will have to be differentiated are as follows:

1. Acute peritonitis, from any cause, in which the history, high leucocytosis, and abdominal rigidity will serve as diagnostic aids, and in which, besides, early operation is also indicated.
2. Gallbladder colic, in which the localization and sudden onset and cessation of the pain, the fever and the icterus, will be of help.
3. Renal colic, in which the localization of the pain, the urinary and the radiographic findings are distinctive.
4. Acute poisoning, from food or other agent, in which a history of taking poison, with diarrhea and either early death or rapid recovery after catharsis and suitable treatment, will establish the diagnosis.
5. Pyloric stenosis, whose slower onset, delayed vomiting, and x ray findings will be of diagnostic importance.
6. Acute hemorrhagic pancreatitis, which is difficult to diagnose, but the symptoms of which call for immediate operation.
7. Uremia, in which the edema, urinary findings,

blood findings, etc., should not be difficult of demonstration.

8. Lead colic, in which the chronicity, history and associated muscular weakness will be found.

9. Angina abdominis and gastric crises of tabes, in which the pains are not persistent and do not last as long.

10. Gastrointestinal purpura and angioneurotic edema in which sensitization can usually be demonstrated and which clear up rapidly.

TREATMENT.

The treatment of acute intestinal obstruction is early operation. It is not within the scope of this paper, which deals mainly with the medical or diagnostic aspects of the disease, to discuss the methods of operation, but the writer wishes to emphasize the importance of refraining from extensive operations, the ideal procedure in a patient so weakened by toxemia as is the average obstruction case being an enterostomy or colostomy above the point of obstruction, done under local or nitrous oxide anesthesia. The more extensive operative procedures, which may be indicated, can be done later with greater safety to the patient. Too often, the temptation to do a complete job at the one operation results in the death of a patient whose life might have been saved by the simple drainage operation.

CONCLUSIONS.

1. The reduction of the present high mortality in acute intestinal obstruction depends upon early operation, i. e., operation in the first twenty-four or forty-eight hours after obstruction occurs.

2. Early operation implies early diagnosis and this can only be made by, a, dissemination of knowledge of the early symptoms among the laity, so that medical advice will be sought early, and b, instilling the importance of early diagnosis in the mind of the general practitioner who first sees the case.

3. Medical and surgical textbooks, which pay scant attention to early symptoms and emphasize only the late symptoms, should be corrected.

4. A presumptive diagnosis of acute obstruction should be made from the three cardinal symptoms, peristaltic pain, persistent vomiting, and obstipation.

5. Operation should be performed promptly without waiting for extensive laboratory confirmation of the diagnosis and should be done preferably under local or gas anesthesia. The mortality rate is increased by ten or fifteen per cent. every twenty-four hours. It is better to operate and find no obstruction than to delay and have a dead patient.

REFERENCES.

1. Stone, H. B.: Bernheim, B. M., Whipple, G. H.: *Bulletin Johns Hopkins Hospital,* 1912, xxii, 159.

2. Hartwell, J. A., Hoguet, J. P.: *American Journal of the Medical Sciences,* 1912, cxl, 111, 357; *J. A. M. A.,* 1912, lix, 82.

3. Hartwell, J.: *Exper. Med.,* 1913, xviii, 139.

4. Hartwell, Hoguet, and Beekman: *Archives of Internal Medicine,* 1914, xiii, 701.

5. Murphy, F. T., Brooks, B.: *Ibid,* 1915, xv, 392.
Medicine, 1915, xv, 392.

6 Dragstedt, Moorhead, and Burky; *Journal of Experimental Medicine,* 1917, xxv, 421.

7. Davis and Stone: *Ibid,* 1917, xx, 686.
1917, xx, 686.

8. Dragstedt, Dragstedt, McClintock, and Chase: *Ibid,* 1919, xxx, 109.

9. Cannon, P. R., Dragstedt, L. R., and Dragstedt, C. A.: *Journal of Infect. Dis.,* xxvii, 139, August, 1920.

10. McKenty, J.: *Canadian Medical Association Journal,* x, 835, September, 1920.

11. Sweet, J. E.: *International Clinics,* 1, 72, 1920.

12. Richardson, E. P.: *Boston Medical and Surgical Journal,* clxxxiii, 288, September 2, 1920.

88 Sixth Avenue.

Acute Intussusception*

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Intussusception is the slipping of one portion of the intestine into that immediately adjacent above or below. The descending variety is by far the most frequent. Even a discussion of it will usually require more than one surgeon's experience as a basis. My four personal cases have been very interesting but are too few to justify the expression of strong personal opinions concerning the various phases of this condition. But every practising physician must be interested in it.

It is a form of acute intestinal obstruction. As soon as a doctor suspects this condition he will not take much rest until he has done his duty in the case. Diagnosis looms large, and is particularly important in intussusception because it is the great cause of acute obstruction in children, especially in very young children, who can give little aid in diagnosis. Treves says that one third of all acute intestinal obstructions occur in children. Most obstructions in children are due to intussusception. Romanis (1) studied 374 cases in which laparotomy had been done (taken from the records of the St. Thomas's Hospital, London, from 1898 to 1917), and found that 234 or nearly two thirds occurred in children under twelve years of age.

Intussusception may develop in any portion of the bowel with a mesentery free enough to permit it, but the great majority begin near or at the junction of the small and large bowel. Of 100 cases reported by Clubbe (2) all but two involved the ileocecal junction, from the beginning or soon afterward. Only three were purely colic and one purely enteric, i. e., involved the small intestine alone. Sixty-four began with an invagination of the end of the cecum, twelve with an invagination of the ileocecal junction or valve, and twenty were double. By this is meant that they were primarily enteric, starting a few inches from the cecum and on reaching it causing a secondary infolding of the cecum. Most authorities consider that those beginning in the ileocecal region originate by an invagination of the ileocecal junction or valve into the large bowel. Clubbe distinguished between what he called the ileocecal and the ileocolic varieties, the latter beginning at the ileocecal junction and the former by an invagination of the end of the cecum. Of the ileocecal there were sixty-four cases and of the ileocolic there were twelve. Lorenz (3) also maintains that invagination of the end of the cecum, not of the ileocecal junction, begins the process in most cases. Three and a half years ago I thought I had made an original observation when I saw in a case that the invagination had evidently begun at the end of the cecum. I have since observed it in another case. It might have occurred in the other two cases so far as my observations went. It seems to be generally agreed that these cases begin at the ileocecal valve.

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In making the diagnosis first consideration must be given to the evidence of acute intestinal obstruction, the cardinal symptoms of which are severe abdominal pain, some shock, vomiting, and constipation. But intussusception gives more atypical symptoms than any other of the acute obstructions and the fact that it usually occurs in young children makes the difficulties in diagnosis more troublesome. As a surgeon, I would not regard myself as competent to establish the diagnosis in the usual case, but would seek the assistance of somebody more experienced and competent in the handling of children. I think the most important feature to be considered is the placing of this responsibility where it belongs. If the diagnosis is made early enough operation can cure nearly if not every case. Pain in the abdomen is usually the first symptom. This pain is diffuse in character, shows periodical exacerbations and is often severe. In the place of constipation we usually have apparent diarrhea with tenesmus and blood stained mucous discharges. The intussusception may completely block the fecal current, but the invagination acts as a foreign body within the intestine which in its effort to expel the foreign body gives rise to the tenesmus and the excess of mucous and bloody discharge, with the passage of what feces may be located below the seat of obstruction. The temperature and pulse may be normal and a palpable tumor may be discovered.

The size of the tumefaction may vary from that of an egg to a large section of bowel. When it can be made out it assumes the general shape of the intestine and is frequently spoken of as sausage-shaped. Sometimes its shape yields to pressure. Although it begins usually in the ileocecal region, as it progresses it is dragging the turning in ensheathing portion with it and the enlarging mass continues to move in the line of the large intestine further and further away from its site of origin. Leichtenstern places the most frequent site of the tumor in the region of the sigmoid and then of the rectum. It may be found anywhere in the line of the large bowel to the anus.

The invagination obstructs the fecal current usually completely but this is not its greatest danger. The bloodvessels reach the intestine through its mesentery which is being dragged into the ensheathing layer of bowel with the invagination, so that the bloodvessels become compromised by the constriction of the ensheathing layer and the nutrition of the invaginated portion suffers accordingly. The constriction progressively increases from venous stasis and exudation with consequent swelling of the invaginated portion so that the nutrition of the latter is progressively interfered with until gangrene occurs. The great object in treatment is to release the invagination before the stasis and exudation of the invaginated bowel make its reduction impossible or gangrene occurs. The latter development usually leads to a fatal termination. Clubbe did resection seven times with but one recovery.

If the reduction is delayed, adhesions tend to develop between the invaginated and the ensheathing portions of intestine. Sometimes after they have formed between the serous surfaces at the neck of the intussusception a gangrenous invaginated portion of bowel may slough off and be discharged by way of the anus, the patient recovering. Wichtmann (4) states that the mortality after elimination of such a sloughing intussusception is three per cent. Hermes says that this sloughing off and elimination is rare in children but is relatively much more frequent in adults.

Twenty to twenty-five years ago operative treatment received little consideration. The prevailing method was to invert the patient and inject by way of the rectum large quantities of air or water to force the retrogression of the intussusception which was undoubtedly successful in some cases. In 1905 Clubbe still used and advised it. He employed oil or warm saline injections in all cases with the patient under a general anesthetic and prepared for operation in case the injection failed. The necessity for operation was thus done away with in about ten per cent. of cases. The literature seems to show that since then these injection methods have been entirely done away with. Romanis says that the slight reduction of the lower portion usually accomplished can be most easily brought about by operation. Of his 374 cases treated by laparotomy, in 301 simple reduction was done with a mortality of twenty-six per cent.; in thirty cases reduction with appendectomy with a mortality of forty per cent.; in thirty cases resection and end to end union with a mortality of sixty-three and three tenths per cent.; in ten cases artificial anus with a mortality of one hundred per cent.; and in three cases lateral anastomosis above and below the (nongangrenous and nonresected) intussusception with a mortality of thirty-three and three tenths per cent. We thus see how the mortality mounts when it becomes necessary to do more than a simple reduction. The significance of the high mortality in the cases in which resection was done or an artificial anus was made, lies in the fact that in the latter the condition of the patient was so low that only an artificial anus was justified, while in the former there seemed still a chance to save the patient by resection.

The big fact here is that in more than eighty per cent. of these cases simple reduction sufficed. In my small group of cases simple reduction was accomplished in all four, and the mortality was twenty-five per cent., or only one out of four as in

Romanis's collected cases. The reduction was much more prolonged and difficult in the one patient who died than in any of the other three and this was realized at the time to threaten the prospects of the patient. The question as to whether resection should be done or not came up, but it was thought the patient would have a better chance without it. In only one of Romanis's cases, in which operation was performed within twenty-four hours after the onset of the symptoms, was resection necessary. He says that if symptoms have been present less than thirty-six hours one may feel fairly confident that reduction will be possible. Hipsley (5) operated in fifty cases but he had no death in any case in which operation was performed within thirty-six hours, although one patient died that had been ill thirty-six hours. Peterson operated successfully on a child, four months and two days old, for acute intussusception of thirty hours' duration. It was gangrenous and after resection end to end union of the divided intestine was accomplished by means of a Murphy button. On the fourth day the button was found at the anus and removed.

The last three of my cases have already been reported (6), but it may serve a good purpose to group them all together.

Case I.—Male, three years and nine months old, was admitted to the University Hospital on July 27, 1917. About five days before he complained of pain in the left side of the abdomen and was given cathartics which seemed to relieve the pain. Two days later he began to have paroxysmal pain in the left side of the abdomen. Had had no appetite since and vomited several times. Bowels moved until the last two days during which only bloody mucus was passed. The child looked sick and pale. Pulse was rapid and rather weak, abdomen distended and tympanitic. There was distinct tenderness over the left side of the abdomen. A mass was felt in the lower right abdomen of considerable size, rather movable, soft and tender. Dr. Winslow Drummond was called and he immediately made arrangements for a consultation. Patient was brought quickly to the hospital and operated upon at 9 p. m.

Under ether anesthesia, a right rectus incision was made. An intussusception from twelve to eighteen inches long was found involving the large bowel. Much difficulty was experienced in reducing it and the process was tedious. The invaginated portion of the intestine was found to have in it a small Meckel's diverticulum. The involved intestine was indurated and thickened, somewhat dark in color, and the coats seemed to have been bruised, especially in spots, by the efforts at reduction. It regained good color after prolonged applications of hot saline solution. On leaving the clinic the patient's temperature was 99.4, pulse 160, and respirations 32. Later he improved, but about 2:30 a. m. he began to get worse and died at 7:40 a. m.

The question of resection came up at the time of operation and in the light of later developments probably should have been risked, but at the time it was thought the patient would have a better chance without it. He evidently died too soon for peritonitis to have developed. Elsberg (7) says: "Surely at times a devitalized segment (of bowel) appears to be responsible for a lethal termination long before there has been time for bacterial action to play a part in the result."

Case II.—Male, thirteen years old, referred by Dr. George E. Shaffer, was admitted to the Northeastern Hospital on July 10, 1918. On the preceding day the patient was taken with severe abdominal pain and vomiting. There had been no bowel movement for two days when on the morning of admission he had a movement showing some blood. There was marked rigidity of the entire abdominal wall, tenderness in appendiceal region, and a diffuse pain around it. Dr. Shaffer had detected a lump between the last rib and McBurney's point. The intern had failed to find it but when the patient was under ether it was again detected. Appendicitis had been diagnosed. Operation was done soon after admission, with the McBurney incision. The basal portion of the appendix was concealed in an ill defined mass which exhibited much induration but no adhesions. The mass could not be moved into the incision and the appendix could not be released from its imprisoned position. The ileocecal junction was not involved in the mass. A higher incision was made along the outer border of the rectus muscle extending upward to about two inches of the costal margin. It was still difficult to outline and determine the character of the mass, and while it was being manipulated, suddenly the appendix was released and the cecum took its normal form. It was now seen that we had been dealing with an intussusception of the end of the cecum which had carried in with it that portion to which the appendix was attached. The cecal wall was much thickened by edema which also involved the appendix to such a degree that it now protruded rigidly through the lower abdominal incision. The whole of the involved portion of intestine, including the appendix, had a bluish discoloration indicating the probable threatening of a gangrenous process. This rapidly disappeared after the correction of the invagination. The appendix was removed, both wounds closed and the healing was uninterrupted.

Case III.—Male, seven months old, about 8:30 a. m., October 8, 1919, manifested severe abnormal pain and soon began to vomit. At 9 p. m., Dr. M. V. Leoff was called and he in turn called in consultation Dr. J. H. McKee. Intussusception was diagnosed and immediate operation advised. This was begun about 2 a. m. at a private hospital, Dr. Leoff assisting. A right rectus incision exposed a mass which proved to be an intussusception. Gentle traction on the entering portion of the small intestine and pressure on the distal end of the mass led to slow reduction of the intussusception which proved to be of the ileocecal variety. The cecum was considerably thickened and indurated from edema. The wound was closed and dressed. Recovery was without incident and the patient was sent home in a week.

Case IV.—Female, four months old, was perfectly well until the evening of October 29, 1919, when she suddenly and without any apparent cause began to cry. This continued all night and on the following day Dr. Israel Myers was called in. By the next day two stools had occurred but the pain continued, the stools concealing the intestinal obstruction. Dr. Myers called in Dr. McKee. No abdominal tumor could be felt even by digital examination of the rectum. Operation was begun about 8 p. m. on the same evening at St. Agnes Hospital. Right rectus incision exposed a distended small intestine. The large bowel was found above and to the left side of the abdomen and was seen to contain an indurated mass which proved to be an intussusception. The proximal end of it was exposed with considerable difficulty near the midline at the level of the transverse colon. The entering portion of the small intestine was held firmly and closely to the posterior abdominal wall and was exposed with much traction on the surrounding viscera. The distal end of the intussusception was felt to extend more than halfway through the sigmoid loop and to move forward and backward within the intussusception showing that the layers were not adherent to each other. After prolonged and gentle traction on the small intestine and pressure from below on the end of the intussusception, it was slowly and completely reduced.

It was observed that as the final steps of the reduction were taking place the ileocecal junction appeared first, then the base of the appendix, followed by the whole appendix, and finally the end of the cecum successively. This would seem to indicate that in the formation of the intussusception the last part to appear was the first to go in, i. e., that the first part to invaginate was the end of the cecum and not the ileocecal junction as commonly supposed. At the time I thought that this was probably a new observation but as shown in the earlier part of this paper it was long before pointed out. Healing was uneventful and the patient was taken home at the end of a week.

CONCLUSIONS.

The real problem in intussusception is to make prompt diagnoses general. If the diagnosis were as easy as in appendicitis the mortality of operative reduction would probably be less than that of appendectomy. If operative reduction were done in all cases within twelve hours after the onset of the condition there would probably be very few deaths from this condition.

REFERENCES

1. Romanis: *Practitioner,* September, 1918.
2. Clubbe: *British Medical Journal,* June 17, 1905.
3. Lorenz: *Deutsche Zeitschrift für Chirurgie, 77,* 1.
4. Wichtman: *Ibid.*
5. Hipsley: *Medical Journal of Australia,* November 9, 1918.
6. Thomas: *Annals of Surgery,* lxx, p. 125 (Case I); lxxiii, p. 638 (Cases III and IV).
7. Elsberg: *Ibid,* lxxiv, p. 584.

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Fluoroscopy in Diseases of the Abdominal Organs*

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Fluoroscopy of the gastrointestinal tract has been practised for many years. Those of the Continental school, particularly the German and French, early employed this form of x ray in preference to the plate method. These pioneers were mostly internists. They were satisfied with information regarding motility, mobility, peristalsis, tone and position. They used plates sparingly in confirming these findings and in attempting to demonstrate actual lesions. These workers, many of them, established a fluoroscopic or x ray syndrome for each of the diseases and these syndromes varied somewhat according to the individual investigator. Some of these deductions, in view of our present knowledge, were not correct, but on the whole much valuable knowledge has thus been passed down to us. It was not long, however, before the special röntgenologist became a necessity and his enthusiastic devotion to this field of work has given us perhaps the most valuable of diagnostic methods. While we may not all of us agree as to the relative value of x ray plates in diagnosis, according to our experiences with good or bad plates and indifferent reports, few would dispense with them, and it is not fair to compare the plate method with fluoroscopy or vice versa; both have their limitations. When it is possible the ideal arrangement provides for the use of both methods together without too much overlapping or expensive repetition. In large clinics where expense is an item it has proved satisfactory to use the fluoroscope to sort out the cases and those that prove interesting to plate. In the hands of the internist, however, the fluoroscope becomes an instrument to be used by him as he uses his stethoscope, ophthalmoscope, or other instrument, as an adjunct to the other clinical methods. It is concerning this kind of fluoroscopy with which this paper deals.

It is hardly necessary to caution against the dangers of fluoroscopy both to the patient and the observer. The necessary precautions should never be lost sight of, but in the modern apparatus protection is reasonably assured and our knowledge of dosage is such that only carelessness can result seriously. Very young patients, the old and those debilitated by long illness are relatively more susceptible than are the robust. The recent use of iodine or other counterirritants weakens the skin resistance. An exposure to a ray, the elements of which are a five inch gap to five mil., should not exceed twenty minutes within a period of two weeks as the effect of the ray is accumulative. It has not been proved that constant exposure has any constitutional effect on the fluoroscopist. The confinement in a badly ventilated space and the severe eyestrain are probably responsible for the headaches and fatigue experienced by those doing this kind of work. Lead inpregnated gloves of the heaviest kind are to be constantly worn, as the manipulation under the screen is a very important part of the examination. Considerably more than fifty per cent. of the information obtainable is brought out by this manipulation. It is useless simply to view the shadows on the screen. One might better take plates—and wooden spoons and other such devices are not practical.

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Simplicity in technic is desirable but it must be rigidly standardized. The patient should not prepare in any manner except to refrain from eating breakfast the morning of the first examination, or luncheon if it takes place in the afternoon. A cup of clear tea or black coffee one or two hours before the exposure is allowable. If the individual is in the habit of taking mineral oil or any simple mild laxative every night, this may be allowed the night before, but no castor oil, salts, or other cathartics. There can be no objection to a small low enema. A barium meal, no matter how much of regular food elements are added, does not approximate normal food in its behavior in the gastrointestinal canal. But such a meal, when sandwiched between normal meals, tends more nearly to approximate the normal rate than when it is introduced into an empty collapsed tube or one that has been recently lashed into spasticity by cathartics. It seems to make little difference what sort of barium meal is employed so long as it is thoroughly mixed and sufficient barium is used—at least half a pound.

Many failures in fluoroscopy are caused by insufficient preparation of the observer's eyes. Ten minutes at least in the dark or dimly lighted room are necessary to relax the accommodation. If a number of patients are to be examined the thinnest should be taken first.

The patient, stripped to below the waist, is placed on the stand in the anteroposterior position. The heart, arch and lungs are quickly scanned for gross irregularities. Deep breathing will show up any inequality in the excursions of the right and left diaphragm. Such inequality may tell of inflammatory trouble below as well as above the diaphragm. The patient is next placed in the right anterior, three quarters oblique position. Holding the glass of barium mixture in his left hand he is told to swallow the meal rapidly. Observations on the esophagus through an elongated but otherwise reduced diaphragm are thus possible.

We can state, dogmatically perhaps, that any lesion in the esophagus that is capable of causing symptoms is accompanied by some dilatation above the site of the lesion. It may be only slight but the experienced eye rarely misses it. When the lesion itself is not sufficient to obstruct, the local spasm which accompanies it is the direct cause of the dilatation. The gastrointestinal canal throughout is particularly prone to spasm. Very slight irritation at any point will cause spasm in that zone, and wherever a valve is placed this valve is subject to spasm from not only local irritations but from distant parts in trouble as well. It is to the operation of this autonomic mechanism that we can attribute most gastrointestinal symptoms.

Armed with this knowledge and the means for observing the operation of the mechanism, diagnosis is made easier. When any defect or dilatation is discovered in the esophagus a plate or two should be taken to confirm, as it is not always possible fluoroscopically to differentiate between a malignant and a nonmalignant inflammatory process in the walls of the esophagus.

It will not be possible to describe in detail the manner of examining the stomach; only an actual demonstration would be of use here. It must be understood, however, that only by means of the deepest manipulation can the organ be observed satisfactorily, and it is examined from all angles and in all planes. It is possible to go over the posterior and anterior borders, as well as both curvatures, in a search for niche, filling defects, incisura or other abnormalities in outline or contour. If one will give sufficient time to it, these defects when present can be seen. We cannot always differentiate fluoroscopically between the filling defects caused by malignant and nonmalignant disease, so that when such a shadow presents and the finger printing or other distinguishing features cannot be seen, a plating should be done. This, however, does not frequently happen.

It does not require much experience to diagnose the character of the peristalsis, the size of the stomach, its tone and position, or the presence and location of spasm. These are all important items; they are, however, significant only to the diagnostician who understands the motor and other functions of the stomach normally or in disease. It is for this reason that the clinician armed with complete clerical and laboratory data should make the observations. If this is not possible then the fluoroscopist should be held down to a rigid standardized report of his findings and should not attempt to make a diagnosis.

In disease of the duodenum the fluoroscope comes into its own as an instrument of precision in negative as well as positive diagnosis. The manipulation here necessary is most difficult, but by patience and a degree of skill that can be easily acquired, nearly one hundred per cent. of cases of duodenal disease can be diagnosed fluoroscopically independent of all other findings. Induration and local spasm largely cause the filling defects that make duodenal or postpyloric ulcer evident fluoroscopically. It only requires a little experience and an application of deductive reasoning to differentiate these defects from those caused by adhesions, bands or pressure from without the canal. Malignancy, except by extension, is here so rare that it need not be considered in differential diagnosis.

The second and third portions of the duodenum are important to observe, as stasis and backtracking here frequently take place because of kinking or bands and the symptoms thus caused are misleading when the true conditions are not discovered. The diagnosis is difficult—in fact rarely possible by any other means than the fluoroscope. It requires considerable manipulation and maneuvering to bring out the shadows peculiar to such changes.

The position or the tone of the small intestine beyond the duodenum cannot be studied satisfactorily by means of the fluoroscope except where adhesions or growths cause partial or complete obstruction. Here the distended section of intestine tells the story. The barium passes so rapidly through the small intestine that it is most difficult to make any satisfactory observations on it unless there is stasis at some point.

The first observation carries us through to the third portion of the duodenum. By the time this is completed, the experienced fluoroscopist has a definite knowledge of the motor function of the stomach. He estimates this by noting the character of the peristalsis, the tone, size and position of the stomach and the ease with which he is able to express stomach contents into the duodenum, so that it is not so necessary for him to check up by the three or six hour examination. If he has seen many cases of obstruction he can usually thus diagnose the condition without waiting. Still, if possible, this should be done as a refinement. The three hour interval gives the most information as a rule. It is not difficult to calculate approximately the amount of residue, and at this time if there is a residue it can be utilized again to fill out the pars pylorica and especially the cap to confirm any defects that might have been suspected but not positively proved at the first examination.

Over ninety per cent. of normal stomachs are empty three hours after a barium meal, so that the minor degrees of stasis may be demonstrated at this time, as well as the more pronounced degrees, while six hours after the meal only the more serious errors of motility are discoverable. Where plates only are used the three or six hour exposure is essential as the radiographer does not have the advantage of feeling and actually expressing the opaque contents from the stomach through into the duodenum as does the fluoroscopist. Twenty-four hours after the barium meal has been taken the colon normally should be filled with the opaque material and defects of any kind, malpositions and irregularities in tone demonstrable. But the barium enema, administered to the patient prone, and its mode of entrance observed fluoroscopically, is by far the most satisfactory method for diagnosing disease of the colon. This should not be done, however, until all barium from the meal has been evacuated in order that the emptying rate for the entire tract can be established.

It requires only a little experience to enable one to "type" a colon, and it is quite surprising how seldom a perfectly normal gut is to be seen. And it is not a little disconcerting to discover that a large percentage of patients we thought were constipated really show an increased motility, and inversely, many whose chief complaint has been loose and frequent bowel movements are found to be possessed of an inefficient or slow motor mechanism. In our gastrointestinal clinic at Cornell College we found that more than seventy per cent. of the patients suffered from one type or another of colonic disease—mostly functional to be sure and secondary perhaps, but no other changes could we find in the gastrointestinal canal.

An appendix that retains barium after the colon has been freed from it, is put under suspicion, but this does not necessarily mean an organic change beyond a lack of tone. But an appendix that is seen to retain a fixed position, or one which is kinked up and remains in this shape is, in a large percentage of cases, found by the surgeon to be diseased. That an appendix cannot be visualized at any time in the course of examinations, does not mean anything one way or another.

Up to this point we have covered only those organic or functional changes that can be visualized directly. As has already been stated, the gastrointestinal canal is peculiar in its tendency to spasm, —spasm not only of its many valves but in between these gateways as well. The relative independence of its motor mechanism to systemic control is responsible for this provision. In health this autonomic system of semaphore signals and control is of nature's marvels one of the most wonderful; but in disease it seems to run amuck as though a lunatic was in charge of the switch tower. Hence the bizarre and puzzling symptoms with which the internist must reckon in gastrointestinal diagnosis. By means of the fluoroscope we can at least stand by and watch this erratic behavior and having observed it for considerable time we are able to utilize some of the manifestations in diagnosis. For instance, if one sees a stomach that is not unduly large in which the peristaltic activity all the way from the cardia to the pylorus is excessive and deep, and we can demonstrate that there is no obstruction at the pylorus or in the duodenum and that motility is increased, one thinks of gallbladder disease at once. This fluoroscopic syndrome has been proved peculiar to gallbladder irritation in a large percentage of cases, and again acting through the ileopyloric reflex, disease in the lower right quadrant is prone to cause spasm of the pylorus and antrum. So that if we observe a normal peristalsis up to the antrum but with definite spasm of the antrum and no local lesion to account for it, trouble in the lower right quadrant is to be thought of.

Unfortunately from the diagnostic viewpoint, there are other sources of trouble in the abdomen that are capable of expressing themselves in like manner, so that it is extremely dangerous dogmatically to ascribe this or that fluoroscopic syndrome to any particular lesion anywhere within or outside of the abdomen. It is a great help in these extragastric cases, but definite diagnoses cannot thus be made.

In order to check up on our fluoroscopic work, last year we went through the records at the New York Hospital. We reported these results to the Section of Medicine of the New York Academy last fall. Since then we have not been able to bring the report up to date, but the figures illustrate what we have been able to do in fluoroscopy.

We have taken one hundred consecutive cases from the records of our two surgical services at New York Hospital for the purposes of this report.

Dr. H. H. Fellows, of the first medical service, has made the research in the following manner: He examined first the records indexed under postpyloric or duodenal ulcer. There were thirty-one that had been diagnosed at operation by the surgeons as postpyloric or duodenal ulcers; twenty-eight of these had been correctly diagnosed fluoroscopically as duodenal or postpyloric ulcers. In three cases we did not indicate the exact location of the lesion. For instance, in Case 53, series 12, fluoroscopic diagnosis, postpyloric ulcer, the surgeon who operated reported a pyloric ulcer, but the house staff filed this record under postpyloric ulcer. There may have been an error in dictation here, but this result we place in the doubtful list along with the two other cases. Case 59, series 15, and Case 64, series 17, in which the surgeon found duodenal ulcers, we diagnosed fluoroscopically as prepyloric lesions. There were twelve cases in which diagnosis at operation was gastric ulcer. This includes ulcer of the body of the stomach and its prepyloric and pyloric regions. Of these we fluoroscopically diagnosed ten accurately. In one case, No. 133, series 36, we gave an ambiguous report: "Antrum pulled to the right, cap points to left; stem on extreme right side. No filling defects." The surgeon found at operation a pyloric ulcer one and a half inches in diameter. We were evidently in a timid mood when making this report. We list this as a doubtful diagnosis. Case 149, series 41, we reported as negative fluoroscopically for ulcer of the stomach or duodenum. The surgeon found at operation an ulcer on the anterior surface of the stomach.

There were thirteen cases that had been operated in and diagnosed by the surgeons as carcinoma. In ten of these we had given our opinion that the lesion we found fluoroscopically evidently was carcinoma. In three cases the fluoroscopic reports were not clear.

In Case 213, series 93, the fluoroscopic report was: "At prepyloric region on lesser curvature there is a fold or incisure with pylorospasm. The second observation shows splenic flexure full of barium. A mass is felt below; it seems separated from the splenic flexure." The surgeon found a carcinoma of the ascending colon with the hepatic flexure bound down. In Case H. K. (Private Building), series 100, the fluoroscopic report was: "No filling defect of stomach; cap absent; cannot be filled." The surgeon found a large mass at the pylorus. As these reports were not complete, we list them as doubtful.

Up to this point we have fifty-six cases of which forty-eight were diagnosed fluoroscopically with approximate accuracy, leaving eight failures or doubtful diagnoses. Only one was a complete failure.

As we have only recently been keeping duplicate records of our findings in the fluoroscopic room, we have no means for tracing and checking up the large number of negative diagnoses that we have made. So in order to get some idea of what our percentage of correct negative diagnoses is, Dr. Fellows was obliged to search out the histories of cases that had been operated in for extragastric lesions, in which we had given a negative fluoroscopic diagnosis for organic disease of stomach or duodenum.

Among these cases in which the surgeons found extragastric lesions were some that we had in error diagnosed positively for gastric or duodenal diseases. Chronic appendicitis gives the largest number in the extragastric lists. There were twenty-two such cases. In nineteen of these we gave correct negative diagnoses for disease of the stomach or duodenum.

In Case 639, series 74, we reported thus: "Possible adhesions near the pylorus. Very doubtful?" The surgeon found the stomach and duodenum normal. He removed a chronic appendix.

In Case 508, series 63, we reported "A small filling defect on the lesser curvature and a space on the greater curvature that does not take on the peristaltic waves." We gave a diagnosis of gastric carcinoma. The surgeon found small indurated areas in the pancreas (none removed for section). A chronic appendix was removed.

In Case 421, series 84, the fluoroscopic diagnosis was pyloric ulcer. The surgeon found the pylorus normal; he removed a chronic appendix.

Indexed under cholelithiasis and cholecystitis were fifteen cases that had been fluoroscoped. In twelve the surgeons sustained our negative diagnoses for organic disease of stomach or duodenum.

In Case 23, series 54, we reported "A permanent incisure on the greater curvature and an irregularity on the lesser curvature suggestive of gastric ulcer." The surgeon found a cholecystitis.

In Case 181, series 85, the fluoroscopic reports were: "First observation, inclined to exclude organic disease of the stomach or duodenum." Second observation "stomach large, peristalsis weak; some obstruction at pylorus; ulcer the best guess." The surgeon found a cholelithiasis with dense adhesions. In Cases 129, series 89, we reported "A permanent incisure on the greater curvature, pointing to an indefinite irregularity on the lesser curvature. No diagnosis given." Surgeon found cholelithiasis.

There were eight cases indexed under operations for adhesions. In all of these our negative fluoroscopic diagnoses for organic disease of the stomach or duodenum were upheld by the surgeons. In all but one our fluoroscopic findings suggested adhesions, but I cannot understand why we failed here, as our report (Case 56, series 60) is: 'Greater curvature pulled to right but no evidence of adhesions." The surgeon found adhesions of the omentum making traction on the stomach.

We were in forty-eight cases out of fifty-four able to make correct, positive, fluoroscopic diagnoses. We were sustained in our negative diagnoses for possible organic disease of the stomach or duodenum forty-two times out of forty-six. We were most accurate in diagnosing postpyloric ulcer, adhesions, and in our negative diagnoses for organic disease of the stomach or duodenum. In carcinoma we would have done better if we had gone further than we did in reporting, but judging from these reports we must have been influenced considerably by other than the fluoroscopic findings, as I can see but little in the reports to sustain such diagnoses and it is only fair to acknowledge these wanderings.

This gives us a record of ninety per cent. correct diagnoses, with ten per cent. failures or doubtful results. And some of these doubtful diagnoses were not so bad when the conditions under which we did the work are considered.

While we have made no serious attempts to diagnose the extragastric lesions, such as chronic appendicitis, cholelithiasis or cholecystitis, in twenty-six out of forty-five such cases, in addition to excluding lesions in the stomach and duodenum, we were able to give the surgeons a hint that there was trouble at some point in the abdomen not in the gastrointestinal canal itself. Most of these reports read: "Stomach and duodenum fluoroscopically negative; spasm, increased peristalsis, or position of parts indicate extragastric irritation, adhesions, and similar conditions.

The Symptom Pain in the Diagnosis of Appendicitis*

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Celsus, who lived until the early part of the first century of the Christian Era, was the first physician, who, giving due consideration to the phenomenon of pain on the right of the abdomen, described and defined with the name of colic passion that symptom complex to which Reginald H. Fitz, an American, more than eighteen centuries later (1886), has given the universally accepted term of appendicitis. In like manner, all the modern medical men admit that one of the main symptoms of appendicitis is the subjective pain in the right lower quadrant.

Nevertheless, every case of acute appendicitis is ushered in by pain more or less severe but abrupt in onset, and referred to the epigastrium or to the midabdomen, while after a lapse of a few hours the pain becomes localized and more severe in the right iliac fossa.

In many instances, however, such pain is only elicited by pressure either on McBurney's or Munro's point, although the structure most frequently found under these points is not the appendix, but the ileocecal valve, situated in a line drawn from the anterior superior spine of the ilium to the umbilicus, four to five cm. (one and a half to two inches according to McBurney; 2.6 inches according to Munro) from the anterior superior spine. The base or root of the appendix, in the living subject, is on an average about two and five tenths cm. below the valve, on a level with the centre of Poupart's ligament (1) and corresponds on the skin to Lanz's point (2).

The pain in the right iliac fossa, in appendicitis, may be elicited by other means also: by inflation of colon with air (Bastedo's sign); by rectal palpation (Wachenheim's sign), or by gentle pressure on McBurney's point, while the patient, lying horizontally, raises his right leg, causing the corresponding psoas muscle to contract and force the painful appendix against the palpating fingers (Meltzer's sign); by traction on the right spermatic cord, inducing severe pain near the internal abdominal ring, due to irritation of the parietal peritoneum (Horn's sign); by firm, but slow pressure, over the descending colon, proceeding in an upward direction, so as to produce an antiperistaltic wave, or gaseous distention, which passing through the transverse and down the ascending colon will arrive at the cecum, producing cecal distention, and a severe lancinating pain in the right iliac fossa (Rovsing's sign); or finally by pressing a little below the McBurney's point, while the patient is turned on his left side, in which position the swollen and inflamed appendix drops down and pulls on the mesentery, which is usually hypersensitive, in such cases (Rosenstein's sign) (3-4).

On the other hand, especially in the acute cases, the palpation of the appendical region is difficult or impossible on account of the hyperesthesia of the abdominal wall and the spastic contraction of the overlying muscle (muscular defense).

Subjective local pain is present in the great majority of cases of acute appendicitis, but is by no means constant. J. B. Murphy has already remarked that adhesions between the appendix and the visceral peritoneum, do not as a rule cause pain; it is the adhesions to the parietal peritoneum only which produce pain (5).

The great Swedish surgeon Lennander goes still further, holding that the parietal peritoneum also lacks sensitiveness. The same opinion is entertained by William J. Mayo, when he states: "Unfortunately in some persons the parietal peritoneum is not sensitive. We have often seen patients, usually men about fifty, of considerable flesh, but not necessarily so, who have a colic, are quite ill for a few hours, who then take up their work, and perhaps in seventy-two hours are not very ill, yet when you open up the abdominal cavity in one of this type, you find it full of pus" (6).

Recently we have operated in several cases of acute appendicitis of the gangrenous, perforative type, in which neither the topography nor the intensity of the pain corresponded to the position or the degree of involvement of the appendix.

In one of these cases (R. P. of Union Hill, N. J.), there was, at the onset, tumultuous, colicky pain all over the abdomen, followed within a few hours by nausea, vomiting, general abdominal rigidity, and tenderness, more pronounced in the mesogastric region. At operation, performed eight hours after the apparent onset, a gangrenous selfamputated appendix, floating in a mass of purulent fluid, was removed. This patient, when repeatedly questioned, denied the occurrence of any previous attack of the disease, with the exception of a few dull pains, wandering about the abdomen.

A similar case occurred on August 29th of this year. A man aged twenty-two (C. L. De L.), after dinner, was taken suddenly ill with sharp colicky pains in the epigastrium, followed by vomiting and a temperature of 100.5° F. Upon examination there was found a moderate tenderness a little below McBurney's point. The leucocyte count was 12,000. At the operation, performed sixteen hours after the onset, we found a gangrenous retrocecal appendix of clublike shape, which was caused by the presence of an enterolith at the distal end of the ulcerated and perforated appendix. This boy did not remember having ever suffered from a previous attack of the disease, although, after questioning, he admitted having felt a transitory pain "across the stomach" and a backache believed to be lumbago, about four weeks before the real attack.

These cases show that in some instances appendicitis may be almost a silent, symptomless process (latent or quiescent appendicitis: "appendicitis larvata," as termed by Ewald), until a deep ulceration and perforation take place, giving rise to the characteristic clinical picture of acute appendicitis with peritonitis.

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*Read before the North Hudson Physicians' Club, October 31, 1921.

In fact, in many instances, the diagnosis of appendicitis *in vivo* has been impossible, in spite of a prolonged observation period in the hospital (seven or eight weeks); as happened in cases of pylephlebitis of appendical origin, simulating lung abscess (Halstead—7), or in cases of real pulmonary or subphrenic abscesses, following cases of unrecognized or neglected appendicitis (Hall, Babler, Hohlen, etc.—8-9-10).

In another case (N. De F.), there was initial colicky pain in the epigastrium, then vomiting of bile, temperature 102° F., and twenty-four hours later, only on deep palpation one could detect a slight pain in the right lower quadrant. Subjective pain in the appendical region was absent. The leucocyte count was 14,000.

The operation, performed thirty-six hours after the onset, disclosed the diseased organ completely matted to the external wall of the cecum, and concealed by the visceral peritoneum, covered by another thin membranous layer (Fig. 1). This disposition, called by some surgeons retroperitoneal hernia of the appendix, or appendicitis retroperitonealis, should be more appropriately called appendicitis juxtacecalis duplivelata, to emphasize not only the intimate connection the appendix has contracted with the cecum; but also the presence of a double veil, or membrane, completely surrounding and almost burying the appendix.

The outer membrane, called pericolic fold of Jonnesco, or Jackson veil, although interpreted by some authors as pathological production (11) is rather to be regarded as a reduplication of membrane which is constantly found during fetal or postnatal life (12).

Recent investigations of O. N. Eisendrath and W. Schnorr (13) have demonstrated that such a fold is a fine translucent membrane, the upper border of which is almost always at the level of the hepatic flexure, while its lower margin extends down to about one inch above the caput coli.

In some instances, this lower margin covers the entire cecum, else part or the whole of the appendix fuses with the ileocecal fold (bloodless fold of Treves) (14). Sometimes, as observed recently in a case (A. M.), the membrane extends across the anterior aspect of the ascending colon, and passing in front of the duodenum, fuses with the gastrocolic omentum (Fig. 2). Whatever interpretation is given to this condition, the fact remains that it alters profoundly the symptomatology of the inflamed appendix, especially in regard to the pain.

In another case (J. De L., a boy aged twelve), there was subjective pain in the left lower quadrant (the symmetrical pain of Moynihan) (15), but a slight tenderness, elicited by deep pressure on McBurney's point, and a leucocyte count of 17,000 with eighty-five per cent. polynuclears. Twenty-four hours after the onset, an operation disclosed a ruptured gangrenous appendix, hanging over the pelvis and floating in a purulent sac (pelvic abscess) the fluctuation of which had been felt through the rectum before the operation. This case resulted in fecal fistula, which, however, healed in about six weeks.

A striking peculiarity in children is the rapidity with which the initial periumbilical or mesogastric pains are often followed by a sudden general rigidity and tympanites due to a precocious rupture of the appendix, which is not as yet endowed with an elastic submucosa, and to a consequent peritonitis.

Porter (16) calls attention to such a tendency to rapid perforation in young children. From his statistics it appears that seventy-three per cent. of appendices perforate at five years of age, while only twenty-five per cent. perforate between ten and fifteen years of age.

However, in children, there are instances in which a rupture of the inflamed appendix takes place with but a slight stomach ache, little or no pain, and upon opening the abdomen you find a walled off abscess. Cases of this nature have been described by McKechnie (17).

On the other hand, it is admitted that when the appendix has infundibular form and patulous base, a regurgitation of the products of inflammation (exudate) from the lumen of the appendix into the cecum and expulsion from the intestinal tract take place; consequently, a spontaneous recovery (*restitutio ad integrum*) is produced with but a few abdominal pains (appendicular crises of Talamon), little or no distress, and no sequels (appendicitis recedens).

Hans Spitzy of Gratz reports cases of mild appendicitis, characterized by a slight reddening and by the presence of nests of oxyurides and ascarides in the tip of the appendix (18). This form is termed "appendicitis helminthica" and cases of it have been reported by Metchnikoff, Natale, Brun, Guinard, Girard, Bloodgood and Rammstadt (Deaver) (19).

TOXIC APPENDICITIS.

Another variety ought to be considered, that is, the toxic appendicitis. Here the general phenomena conceal the appendicular symptoms (Oddo) (20). The patient is suddenly taken ill, as though it were a grave acute poisoning, he appears depressed, his expression drawn, pinched, his tint leaden or subicteric, his eyes caved in and he vomits a black, tarry fluid (*vomissement noir appendiculaire* of Dieulafoy). His temperature shows a slight rise and more often, hypothermy; while his pulse is rapid, feeble, thready and intermittent. Constant fetid diarrhea, generally involuntary, albuminuria and hematuria are present.

Epistaxis, enterorrhagy and even fatal capsular hemorrhages have been observed. On the other hand, there is an insignificant pain or tenderness in the right iliac fossa, a symptom rapidly overshadowed and overwhelmed by the above described general phenomena which, unless the appendix is removed at once, and sometimes in spite of its removal, as in hypertoxic or fulminating cases, will end in collapse and death.

If any weight should be given to the histopathological researches of Letulle, no appendix is normal in any adult and from statistics of Taft on five hundred autopsies, thirty-six per cent. showed evidences of an attack of appendicitis, although not recognized during life. Likewise Kraussold states that one third of all adult bodies show diseased appendices.

J. T. Williams and R. Slater (21) in one hundred and sixty-seven cases out of five hundred cases of laparotomies, performed for gynecological affections, found changes in the appendix and, although in sixty-four cases the involvement of this organ was evidently secondary to an inflammation of the uterine appendages, yet in one hundred instances (twenty per cent.) they found cases of pure chronic appendicitis with negative history and negative symptomatology, without any concomitant inflammatory process in the pelvis.

Likewise, Ch. Gordon Heyd, of New York, has found out that the appendix shows pathological changes in sixty-nine per cent. of cases of cholecystectomy, in sixty-six per cent. of cases of duodenal ulcer, and in fifty-four per cent. of cases of gastric ulcer (22). In all these cases pain is usually absent in the right iliac fossa.

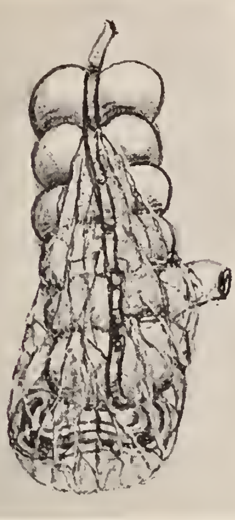

Fig. 1.—Sketch drawn at the time of operation, showing the double veiled appendix.

On the other hand, this is often present in typhoid fever, due probably to an invasion of the parietal peritoneum (Curschmann).

Moreover, every clinician knows that in cases of acute right pneumonia and pleurisy in children, and sometimes in adults also, there is pain in the appendical region.

There are other instances in which pain in the right lower quadrant is caused by a calculus in the right ureter at the level of the appendix and in the female an inflammation of the right adnexa, especially of the right ovary, may simulate appendicitis.

The sudden rupture of a tube in cases of ectopic (tubal) gestation, the bursting of a tubal or tubo-ovarian abscess, the sudden twisting of an ovarian pedicle or the cord of an undescended testicle (cryptorchidism), or the strangulation of an inguinal hernia may all lead to a wrong diagnosis of appendicitis.

It is well known that the form of localized primary tuberculosis of the cecum, described by Dieulafoy as hypertrophic cecal tuberculoma, may be mistaken for a subacute or chronic appendicitis. Hollembach (25) describes a case of tuberculosis of mesenteric glands simulating appendicitis and in one of our cases, F. S., a boy aged six, manifested a striking picture of a subacute appendicitis, while the operation showed a tuberculous ulceration of the small intestine with perforation near the ileocecal valve. Other cases of ileocecal tuberculosis camouflaging appendicitis have been described by A. O. Wilensky (24).

T. Silvestri (25) has reported forty-seven cases in which he found evidence of various foci of tuberculosis of lungs, pleura, joints and genitalia, all of which either preceded, accompanied or followed the attack of appendicitis.

Instances of mesenteric lymphadenitis simulating inflammation of the appendix are recorded by J. W. Struthers (26).

In another of our cases, a right floating kidney, severe sudden pain in the right iliac fossa with pain and tenderness at McBurney's point were the most conspicuous symptoms (Dietl's crises). A similar case has been described by Giordano (27). Edebohls goes further stating that from eighty to ninety per cent. of women suffering from movable kidney suffer from chronic appendicitis also and considers the latter as one of the chief symptoms of the former. A case of hepatoptosis mistaken for appendicitis has been reported by Altobello (28).

In many cases of socalled chronic appendicitis the real trouble was caused by a movable, distended or impacted cecum (29-30). The condition termed cecum mobile is produced by a congenital malformation of the mesocecum, by which the cecum enjoys freedom of movement and displacement. The pain caused by this anomaly is more severe when patient is standing, while it is at once relieved when he is lying on his back or on his right side.

Another peculiarity of the cecum mobile is that chronic constipation does not yield to laxatives and the x ray shows a retention of the bismuth for two or three days (31). Sometimes a chronic recurrent appendicitis has been masked by the process of actinomycosis either of the appendix or the ileocecal region. For the differential diagnosis, we refer to the splendid article of M. Hinglais (32).

Another important, though rare condition, which may closely resemble appendicitis is suppurative periostitis of the inner surface of the ilium. Tumors, like sarcoma, osteoma or chondroma of the iliac bone, may simulate inflammation of the appendix. Symptoms masking closely appendicitis have been observed in cases of recurrent amebic dysentery,

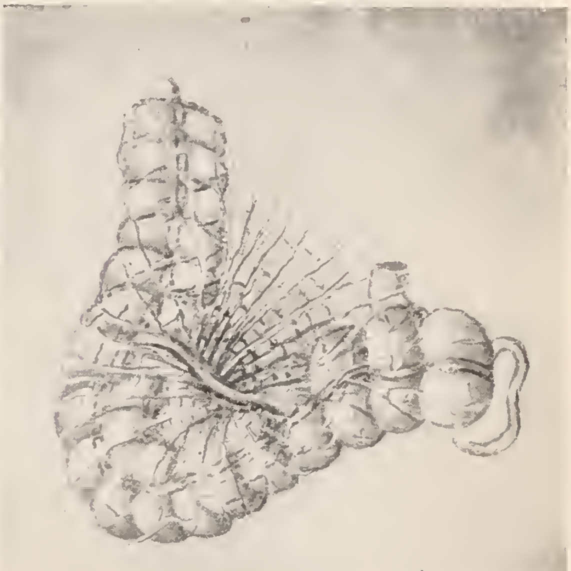

Fig. 2.—Sketch drawn at the time of operation showing the acute angulation between the ascending and descending colon and a fibrous band in the course of the Jackson's membrane.

though the operation disclosed no appendicular involvement (33-34). Coli bacilluria also may closely suggest appendicitis.

Another well known cause of pain in the right iliac fossa is the occurrence of an ileocecal kink of Lane (35), which by interfering with the free passage of the intestinal contents from the terminal part of the ileum into the cecum, causes fecal stagnation, distention of the bowel by gas, a tumorlike mass, in correspondence of the ileocecal region, congestion of the appendix and colic resembling very closely appendicitis. G. Eusterman (36) calls attention to the abdominal cramplike pains due to organic cardiac or arterial diseases, especially arteriosclerosis, which form part of a syndrome called by some clinicians angina abdominis (36). Cases of this kind have been published by House, Moos, Mouro, Kauffmann, Ortner, Schnitzler, etc. G. Tedeschi particularly has demonstrated with his observations how a syndrome of pseudoappendicitis may be produced merely by sclerotic stenosis of the superior mesenteric artery (intermittent angiosclerotic dyspragia of Ortner; intermittent anemic dysperistalsis of Schnitzler) (37).

The enteralgias of hysteria, the "hysterical mimicry of appendicitis" as called by Nothnagel, and the crises of tabes should always be kept in mind when making a differential diagnosis of appendicitis. (Table I.)

A. F. Jonas (38) describes cases of appendicitis in which the seat of pain and tenderness is in the right hypochondrium and from the anatomical topography and pathological features, he concludes that in these cases the appendices are embryologically arrested or undescended.

The same may be said of cases of appendicitis in the left side due to failure of the large intestine to rotate as it does normally at the fourth month of fetal life (39).

Another observation has been finding the subjective pain referred almost invariably to the epigastric region in cases of subacute and chronic recurrent appendicitis, a condition probably due to reflex spasm of the pylorus similar to that occurring in cholecystitis, gallstones, intestinal adhesions, pancreatitis, etc. (40-41-42). It is for this pain that Paterson very appropriately suggests the term of appendicular gastralgia.

Aaron has been able to induce a referred pain or distress in the epigastrium, left hypochondrium, umbilical or precordial region by a continuous firm pressure over the appendical region and while such pressure is produced, pylorospasm may be noted with the fluoroscope. This test has been repeatedly confirmed by the operative findings (distorted, adherent or contracted appendices) and found by the author exceedingly valuable in deciding when and when not to intervene surgically for chronic appendicitis (43).

In some instances tenderness in the appendical region, preceded or not by subjective pain therein, but not accompanied by the other signs or symptoms of appendicitis, with the exception perhaps of fever, has been observed.

This transient syndrome, for which we would suggest the name of appendicodynia occurs at times in cases of acute rheumatism, tonsillitis, sinusitis, pyorrhea alveolaris, saturnism, anaphylaxis, pernicious anemia, and in other conditions, and is probably caused by an irritation of the intrinsic nervous plexuses of the appendix, brought about by the presence in the blood of toxic products of bacteria or mineral poisons, (lead, arsenic), or foreign proteins (anaphylatoxins) or hemolytic substances, namely unsaturated fatty acids. Hunter (44), King (45).

In regard to pernicious anemia, N. M. Percy (46), records that out of twenty cases of operation for pernicious anemia seventeen showed evidence of an old disease of the appendix. However, in a typical case of pernicious anemia, seen in consultation with Dr. G. K. Dickinson of Jersey City, N. J., the appendicodynia developed about a year and a half after the onset of the primary disease and produced no complications, though the patient lived about six months longer, finally succumbing from cardiac decompensation and anasarca. This was the case of an Italian woman.

In another case, a girl aged twelve, sudden pain and tenderness developed in the appendical region with a temperature of 102°. The following day, while these symptoms subsided, pain and swelling of the ankles and knees developed, indicating an acute rheumatic affection of the joints.

A peculiar case was that of an Italian woman, aged twenty-five, in whom, about five weeks after delivery, following a sudden fright there developed a diffuse urticaria and who some days later was overtaken by intense abdominal pain in the right lower quadrant. There was tenderness but no rigidity on the McBurney's point, there was also constipation, mild leucocytosis (12,000) but no increase of temperature. The bimanual examination excluded any involvement of the adnexa. An icebag was put on the painful side, belladonna and benzonaphtol administered by mouth, and within four days all symptoms referred to the appendix disappeared.

In consequence of these considerations, a mere pain in the right lower quadrant of the abdomen should not be regarded as a sure criterion to induce the surgeon to perform an appendectomy.

In fact, in many a case this operation has not helped the patient. The patient generally goes to another surgeon to be relieved of the pain, which is finally overcome either by correcting a dilated or displaced cecum (cecoplication or cecofixation) or by adjusting an incompetent ileocecal valve or by exposing in the wall of the gut and incising a spastic ileocolic muscle, following the suggestion of Groedel, or by removing an inflamed ovary or fallopian tube (oophorectomy, salpingectomy).

On the other hand, following the statistics of Bancroft (47), eighty-one and one fourth per cent. of patients complaining of digestive disturbances were cured by appendectomy. Furthermore, ninety-three per cent. of the patients operated upon early for acute appendicitis, according to Morf (48), ninety-five and one half per cent., according to Stillman (49), and ninety-six and one eighth per cent., as reported by Hugh Lett (50), in his statistics of one thousand cases operated upon at London Hospital, were cured by appendectomy.

When the inflammation is limited to the appendix with little or no evidence of peritonitis, the number of cures reaches ninety-nine and one seventh per cent. (51), and whenever the operation is performed within twelve or twenty-four hours since the beginning of the attack (52), the mortality would be reduced to nothing (52).

Before concluding, the mention of a new impetus given to the diagnosis of appendicitis by x ray methods is worth while.

According to Kirklin (53), by the röntgen methods alone, it is possible to demonstrate from eighty to ninety per cent. of pathological appendices, yet, overenthusiasm in the exclusiveness of these methods may lead to erroneous conclusions.

A study of the serial röntgenograms of the appendix and the gastrointestinal tract (54), made by the surgeon and the röntgenologist together would, however, lead to as great a degree of diagnostic accuracy as that obtained in case of fracture, by stereoscopic radiography.

SUMMARY.

1. The symptom pain in the right iliac fossa, though found in the majority of cases, is not constant, being absent particularly in cases of chronic latent appendicitis, or appendicitis with referred symptoms (appendix dyspepsia of Moynihan), appendicitis juxtacecalis duplivelata, toxic appendicitis, and in cases of silent appendical abscesses giving metastases to other organs through the portal or the lymphatic system.

2. When present, the local pain is changeable in regard to its position, character, and time of its appearance.

3. As a rule in all acute cases the initial pains are of paroxysmal or cramplike character, and referred to the epigastrium or to the mesogastric

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DIFFERENTIAL DIAGNOSIS OF APPENDICITIS

Stomach
Acute gastritis
Acute gastroduodenal catarrh (jaundice)
Chronic gastric ulcer
Perforated gastric ulcer
Epigastric hernia

Omentum
Omental hernia
Strangulated omental hernia
Omental torsion

Pancreas
Acute pancreatitis
Lithiasis

Cecum
Perforating ulcer
Distention or impaction
Cecum mobile
Primary typhlitis
Diverticulitis cecal
Carcinoma
Sarcoma

Peritoneum
Appendices epiploicæ (inflammation or torsion)

Sigmoid
Diverticulitis

Bones
Pott's disease
Tuberculous hip
Rheumatoid arthritis of the spine
Suppurative periostitis of the inner surface of the ilium
Sarcoma
Osteoma } of the iliac bone
Chondroma }

Female Genital Organs
Dysmenorrhea
Menopause
Acute salpingitis R. S.
Pyosalpinx R. S.
Tuboovarian abscess R. S.
Ovarian abscess
Acute oophoritis
Suppurating ovarian cyst
Twisted pedicle of an ovarian cyst

Bloodvessels
Thrombosis of mesenteric vessels
Angina abdominis
Aneurysm of right iliac artery

Infections
Lobar pneumonia R. S.
Acute pleurisy R. S.
Typhoid fever
Actinomycosis

Duodenum
Acute duodenitis
Chronic duodenal ulcer
Perforated duodenal ulcer

Mesentery
Cyst
Fibroma
Fibromyoma
Sarcoma
Lymphosarcoma
Neuromyoma
} At the ileocecal junction

Liver and Gallbladder
Hepatic abscess
Perihepatic abscess
Hepatoptosis
Cholelithiasis
Acute cholecystitis
Empyema of gallbladder
Gangrenous cholecystitis
Chronic cholecystitis

Muscles
Psoas abscess
Acute "stitch"
Tonic contraction of ileocolic muscle
Subphrenic abscess

Male Genital Organs
Cryptorchidism with
  A. orchitis
  B. epidydimitis
  C. twisted cord
Deferentitis R. S.

Skin
Cutaneous hyperesthesia of right lower quadrant

Lymphatic System
Acute adenitis and tuberculosis of
  A. iliac glands
  B. ileocecal glands
  C. mesenteric glands

Parasites
Appendical helminthiasis
  Oxyurides
  Ascarides

Ileum colon
Enteralgia
Enterospasm
Enterolithiasis
Acute enteritis
Colitis
Dysentery {
  epidemic
  bacillary
  amebic
Chronic intestinal stasis
Intestinal obstruction {
  volvulus
  intussusception
  ileus
Perforating ulcer of ascending colon
Enteroptosis
Incarcerated or strangulated intestinal
Tuberculosis of the ileum and ileocecal region
Diverticulitis of colon
Carcinoma of colon
Ileocecal valve obstruction (or stenosis of the orifice)

Urinary Apparatus
Acute cystitis
Floating kidney with or without Dietl's crisis
Floating kidney with twisted ureter
Colibacilluria
Nephrolithiasis {
  uric
  phosphatic
  calcium oxalate
  cystin
} calculi
Pyonephrosis
Perinephritic abscess
Multiple abscess of right kidney
Septic infarct of right kidney
Toxic nephritis
Ureteral calculus
Hydronephrosis
Pyelitis

Nervous System
Appendicalgia or appendicular colic
Herpes zoster of the 11th and 12th intercostal, and 1st and 2nd lumbar nerves
Tabetic crises
Neurasthenic and hysterical enteralgias

Structures Interfering with Peristalsis
A. Congenital
  1. Jackson's
  2. Ileocecal kink of Lane
B. Acquired
  1. Adhesions
  2. Bands

Appendicodynia
A. Acute general or focal infections {
  rheumatism
  tonsillitis
  pyorrhœa alveolaris
  dental infection
  paranasal sinusitis
B. Mineral poisonings..... {
  saturnism
  hydrargyrism
  arsenical poisoning, etc.
C. Primary anemias {
  pernicious anemia
  hemolytic jaundice, etc.
D. Anaphylaxis..... {
  urticaria
  eczema
  asthma
  serum disease, etc.

region, and almost always accompanied by nausea and vomiting, followed by pain, rigidity and tenderness in the right iliac fossa, a rise in temperature and an increase in the number of leucocytes (Murphy).

4. The subjective pain and tenderness in the right iliac fossa become evident as soon as the diffuse initial pain subsides.

5. The epigastric or midabdominal pains in children, generally overshadow the pain in the right lower quadrant, being rapidly followed by symptoms of general peritonitis, due to precocious rupture of the appendix. There are, however, a limited number of silent cases of appendicitis which either clear up by spontaneous drainage into the cecum, or end by a slow process of gangrene and periappendicitis which form a localized walled off abscess.

6. In chronic recurrent appendicitis the subjective pain, generally, is not referred to the right iliac fossa, but to the epigastric region, probably due to a reflex pyloric spasm.

7. The mere pain in the right lower quadrant, not accompanied by the other chronopathological symptoms, is not sufficient evidence of existing appendicitis, but rather of reflex origin, as in lobar pneumonia, typhoid fever, cholelithiasis, etc., else the symptom of a calculus in the right ureter, or of oophoritis, or oophorosalpingitis.

8. Any appendectomy based exclusively upon the symptom pain in the right lower quadrant may spell failure as far as the therapeutic result is concerned, whereas, when performed early, in conditions referred to, it accomplishes a cure in about ninety-six and one eighth per cent. of all cases and ninety-nine and one seventh per cent. in cases of localized appendicitis without peritoneal involvement (Lett, Deaver).

9. Other abnormal or pathological conditions of the abdominal organs, as for instances: A right floating kidney, movable cecum, ileocecal tuberculosis, adenitis of mesenteric glands, especially tuberculous, ileocecal actinomycosis, acute suppurative periostitis of the inner surface of the ilium, tabetic crises, anginoid pains due to sclerosis of the superior mesenteric artery, and other conditions, should always be borne in mind when making a diagnosis of appendicitis.

10. The occurrence of toxic appendicitis, as described by the French authors, is rare and should be more properly classed as fulminating appendicitis.

On the other hand there are a certain number of cases, characterized by transient tenderness and pain in the appendiceal region and by absence of other signs or symptoms of appendicitis, which occur sometimes in the course of some infectious diseases (acute rheumatism, tonsillitis, etc.) or mineral poisoning (saturnism) or primary anemias (pernicious anemia) or anaphylactic disturbances (urticaria, eczema, serum disease), and undoubtedly are due to toxic substances in the blood stream which stimulate and irritate the nerves of the appendix without causing any clinical sequence in it. For this group, we would suggest the term appendicodynia.

11. The röntgenology of the appendix and the gastrointestinal tract requires further development. The collaboration of the surgeon with the röntgenologist would enhance the accuracy of diagnosis.

12. Appendicitis is as a typical as any other abdominal affection, therefore, neither pain nor tenderness, nausea nor vomiting, fever nor leucocytosis are to be considered as pathognomonic symptoms; but the discrimination of these fundamental symptoms and signs, and above all the comprehension of their development and interrelations are sufficient evidence to warrant a positive diagnosis of appendicitis and a timely intervention by the surgeon.

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The references will appear in the author's reprints.

The Cause and Prevention of Gastrojejunal and Jejunal Ulcer*

By ABRAHAM O. WILENSKY, M.D.,

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The problem of the postoperative gastrojejunal or jejunal ulcer is most important and particularly baffling. For whereas in the ordinary primary varieties of gastric and duodenal ulcer we have had nothing at all to do with the creation of an unhealable defect, in the secondary postoperative ulcers we have ourselves ploughed and planted the field upon which, later, an ulcerating defect appears, persists, and fails to heal. Truly, gastrojejunal or jejunal ulcer following operation is an experimental ulcer, just as experimental as if one had done the various steps in its production upon a laboratory animal. The baffling part of the situation lies in the fact that although the entire biological history of this experimental ulcer is entirely open to us, no success follows the many and repeated attempts to clear up the mystery and the essential cause still eludes us.

The cases of gastrojejunal or jejunal ulcer that are being reported in the literature are apparently growing in number. Mandl's survey shows that there are over two hundred cases in the German literature alone. I agree with Horsley that for every case of actual ulceration in the line of the gastroenteric stoma there are surely other cases of hyperemia, inflammation or irritation which, in many cases, do not come to operation and which, in others, disappear spontaneously. Such cases in their symptômatology would mimic accurately the actual ulcerations.

The dominant factors which precede the appearance of the secondary ulcerations include, 1, an operation of some kind, and 2, a preexisting gastric or duodenal ulcer.

I mention the operative factors first for here one deals with fairly well known factors. The operation includes a number of general components which are common to all abdominal operations and, therefore, can surely be excluded from discussion as etiological causes for the appearance of secondary ulcerations. One is then left with the actual manipulations necessary in the fashioning of the stoma. Various men have implicated in turn every factor which enters into these manipulations: the position of the stoma, the use of clamps, the use of nonabsorbable suture material, marginal necrosis, injury of tissue, etc. The very fact that opinions have gone from one to the other, and have covered them all, necessarily implies that no one of them has been entirely satisfactory and that probably all of them are only incidents—perhaps important but not necessary incidents—in the making of the secondary ulceration. And surely if these factors were operative to the extent to which they are said to be, the proportion of gastrojejunal or jejunal ulcers appearing after operation would far outnumber the two or three per cent. which these secondary ulcerations are said to number.

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The second dominant factor in the situation is the presence of an ulcer in the stomach or duodenum for which the operation is undertaken. The presence of the ulcer implies all those changes in function, in the chemical as well as in the motor powers, which have been widely discussed in the past few years. These, too, have been implicated, especially the change in the chemistry with the hyperacid condition usually accompanying ulcer, in the production of the secondary ulcers. The facts here are similar to those just mentioned. The knowledge which we have of the anteoperative and postoperative variations of the normal stomach functions indicate all too clearly that it is extremely probable that the changes in the chemical function, as well as those in the motor function, are secondary and accompany manifestations of a diseased condition of which the concrete result is an ulcerating defect which refuses to heal. One knows quite well that in the immediate period following the making of a gastroenteric stoma any hyperacid condition of the stomach is likely to depreciate in its intensity even if it is only a temporary phenomenon; and yet there are numerous cases of secondary ulcer at or at some distance from the stoma, which appears while the total gastric acidity is still diminished and before the depreciated condition of the gastric juice is compensated by an increased production of acid. For these reasons, and especially because the number of cases of secondary ulcer are proportionally small, I do not believe that the changes in physiology are essential to the persistence of an unhealable defect.

Practically all the cases of secondary ulcer have followed operations for primary ulcers in the stomach or duodenum. The exceptions are those very few cases—both numerically and proportionally—which have followed resection and gastroenterostomy for carcinoma of the stomach. This brings up a very important point. In the first place it places a large share of the burden of guilt upon the presence of the primary ulcer in the stomach or duodenum. In the second place, the occurrence of the secondary ulcerations after a primary operation for carcinoma only makes one think that this is really no exception to the rule, but rather that in these cases of carcinoma the malignant growth was engrafted upon a preexisting ulcer. The essential facts, especially the proportionate numbers of ulcer, engrafted carcinoma and gastrojejunal or jejunal ulcer, bear this statement out exceptionally well. Evidently whatever changes the carcinoma has made have not removed those earlier attributes of benign ulcer which are so essential to the formation of the primary ulcer or of secondary ulcerations at subsequent periods. So that a situation which is at first somewhat disturbing is really supporting; one can say with perfect truth that secondary ulcers at the stoma or near it in the jejunum occurring after primary operations upon the stomach or duodenum all follow a preexisting ulcer in the latter locations.

At times, during operations in the upper abdomen away from the stomach and for conditions other than ulceration, it becomes necessary to do a gastroenterostomy. To give only one concrete illustration of that to which I have reference, let me say that sometimes in doing difficult secondary operations upon the gallbladder or biliary passages, the stomach or duodenum is accidentally opened. At the conclusion of the manipulations it seems to the operator that in order to guard the suture line in the stomach or duodenum, it is necessary to exclude the pyloric end of the stomach and to do a gastroenterostomy. The point which I wish to bring out here is that under such conditions the stomach and the duodenum are guiltless of any preexisting ulcer, or, so far as one can tell, of any preexisting ulcer tendency. I myself have seen a number of such gastroenterostomies. I have never, however, observed a secondary ulcer appear later either in the stoma or in the jejunum, nor have I been able to find such a one recorded in the literature under such conditions. The importance of this observation is very great, for it indicates that the presence of the preexisting ulcer, or socalled ulcer tendency, is one of the two most important factors in the formation of secondary ulceration.

This only upholds the present day majority opinion that secondary ulcers at the gastroenteric stoma, or at some distance in the proximal jejunum following primary ulcerations in the stomach or duodenum, are essentially the same lesions, with similar morphology, subject to the same etiological causes and laws of development, produced by a similar mechanism, characterized by similar accompanying changes in function and noted by similar symptomatology. That such secondary ulcers do not appear more frequently is a compliment to the skill of modern surgery and a monument to the protective powers of the human animal organism; for the operation has produced ideal conditions for the further appearance of ulcers and only a small number—two to four per cent.—of "takes" become recorded.

The conviction is therefore unescapable, that whenever the true etiological cause of the primary ulcer is found, that of the secondary ulcer will also be available; and that whenever we have the cause of gastrojejunal or jejunal ulcer, the etiology of gastric ulcer will become common knowledge.

The recounting of these facts is essential because they point out clearly that all our available knowledge in regard to these secondary ulcerations can be summarized in a number of known factors which are common to all cases of postoperative secondary ulcer at the stoma or in the jejunum, plus one unknown common factor—the elusive ulcer tendency or cause.

The available information in all cases of secondary ulcer points to the fact that in all reported cases the type of operation which has been employed has included a gastroenterostomy, in some cases employed alone, in others aided by an exclusion operation, and in still others as part of a resection operation. Under these circumstances the gastroenterostomy itself necessarily looms up as an overshadowing factor dominating the entire situation, because of the fact that it is the one controllable factor in the surgeon's hands. To put it mathematically, postoperative gastrojejunal or jejunal ulcer equals a preexisting ulcer or ulcer tendency plus a gastroenterostomy. Necessarily the omission of any item from this equation nullifies the result; if one omit the gastroenterostomy one obviates secondary ulcerations at the stoma or in the proximal jejunum; if one practises gastroenterostomy, one simply invites the appearance of more of these ulcers. This is the important lesson which one must learn.

I realize that there will be times when gastroenterostomy apparently must be done. But the number of such emergencies must be very small and with greater practice, skill, and experience they will grow smaller. For the average case other types of operation had better be chosen, those types in which gastroenterostomy plays no part. I speak of the pyloroplasties and the stomach resections of the Billroth I type, as well as sleeve resections for ulcers in the midgastric region. Perhaps much of the dissatisfaction with the operation of gastroenterostomy can be explained and prevented on this basis.

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Dietetic and Treatment Regulations in Gastroduodenal Ulcer

By ANTHONY BASSLER, M.D.,

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There have been a number of requests for a detailed plan of the treatment employed by me in gastric and duodenal ulcer. No claim is made for originality in any way, because it really is a combination of the initial fasting of Ewald's method, the hourly milk and cream feedings and alkaline powders of Sippy, my own diet for working down hydrochloric acid secretion, and x ray therapy. Both of the latter were advanced in 1910 and have been employed steadily since then (1).

The treatment is begun with no food by mouth for twenty-four to forty-eight hours. During this time the patient is given calomel quarter of a grain every fifteen minutes for eight doses, and Carlsbad salt twelve hours after finishing and at twelve hour intervals during the fasting period. Cool but not iced water is allowed to be drunk in sufficient quantities to allay thirst. Alkalies are administered from the beginning to neutralize any gastric juice secretion that may be present. During the fasting period ten grains each of sodium bicarbonate and bismuth subcarbonate are given every three hours, six doses in all in twenty-four hours, there being an interval of six hours through the night.

The feeding is then begun. Three ounces of a mixture of equal parts of cream and milk are given every hour from 7 a. m. to 7 p. m. for three days (1835 calories), and the alkaline powders of sodium bicarbonate and bismuth subcarbonate. To keep the bowels open an alternating powder of sodium bicarbonate and calcined magnesia are given midway between each feeding. This corresponds to the first three days' method of Sippy, and represents about 1325 calories a day. On the evening of the second day of this feeding note is made if there is any free acid secretion residual in the stomach. This is done usually at 11 p. m. by aspiration of the stomach contents with a fractional test tube and testing the return or by swallowing a gelatine capsule having an extension of string inclosed in the capsule impregnated with congo red or dimethyl and dried and withdrawn after being in the stomach fifteen minutes. On the finding of a positive acid, the urine is voided and passed again in an hour, note being made of the reaction of the last specimen. If no acid is present in the stomach (even if the urine is slightly so) no alkalies are given throughout the night for the next fifteen days of the bed treatment. Generally by this time the stomach is negative to acid and the urine also. If acid is met with in the stomach and urine also, alkalies are given at three hour intervals throughout the night for the remainder of the days in bed in quantities to keep the urine alkaline or neutral to litmus paper. Modification here depends upon the reaction of the urine, this being noted at the end of the day and before feeding is resumed in the morning.

On the sixth day from beginning the treatment, a mixture of eggs, cream and milk is given at hourly intervals. Soft eggs and cereals are not employed as Sippy advises, for the reason that whole eggs, and especially when they are cooked, cannot be accurately controlled in quantities. Cooked eggs had better not be given, and no cereals should be given until after the bed treatment is terminated, for they somehow tend to diminish the best results. The mixture I employ is the following:

	Amounts at feeding	*Milk*	*Cream*	*Eggs*	*Calories*	*Time*	*Number*
6 to 9 day	3½ oz.	25 oz.	25 oz.	2	2050	hourly	13
9 to 12 day	4 oz.	22 oz.	34 oz.	3	2650	hourly	13
12 to 15 day	4½ oz.	20 oz.	44 oz.	4	3275	hourly	13

From the fifteenth to the twenty-first day the feedings are in five ounce quantities of equal parts of milk and cream. Four eggs in the day are allowed cooked in any soft way. At this time forty grams of sugar are allowed, not in the form of saccharose (cane sugar) which stimulates acidity and tends to constipation, but as lactose, maltose, etc. The feedings at this time are extended to two hour intervals and the milk and cream mixture on thickly buttered toast at two meals is allowed. (This represents 3450 calories a day). Effort is made in these six days to lengthen the interval of feedings so that on the twenty-first day meals of milk, cream, eggs, bread and butter and sugar and milk and cream are given at eight, twelve, four and eight o'clock with one or the other of the alkaline powders one hour after each of them and a milk and cream feeding at ten, two, six and ten p. m., followed by a powder.

We must agree with Sippy that the aftertreatment of these patients is most important. I find, though, that the hourly feedings with city people are not practicable and the feedings of milk and cream hourly between a light breakfast, luncheon and supper, even with the thermos bottle method he advises, need not be followed. For the first month out of bed I do not allow soft or strained foods, such as jellies, marmalades, vegetables, or leguminous purees as Sippy advises. Instead patients are kept absolutely on the four foods mentioned above, and a diet which represents 3780 calories a day is strictly maintained. Such a diet is given below.

The diet is a temporary one and is to be continued until a change is made. The plan is not to partake of any solid foods whatsoever and to take the foods that are suggested at regular intervals of four hours during the day, making sure that a strict regularity is preserved and that the foods are divided up rather evenly in quantity for each time. A glass of plain fresh milk and perhaps a few crackers should always be taken between meals and before retiring, and an extra glass of milk during the night if there is distress in the stomach.

The diet consists essentially of only four foods, namely, eggs, fresh milk and cream, well cooked cereals, bread and crackers and nothing else in the food or fluid line (excepting plain water) should be taken. The eggs may be eaten raw or cooked in any form, or may be taken in the milk. The milk may be warmed if desired, but should not be taken too hot or too cold. The ten minute modern breakfast foods or any form of oatmeal should not be eaten, the old fashioned forms of ground corn, farina, rice, tapioca or sago, well cooked being the best. The bread should not be too fresh (one day old), any of the sweetened or unsweetened crackers can be used and all forms of simple cake, providing there are no nuts, raisins, seeds or preserved fruits in it.

The total amount of food in one day should be: four eggs, one quart (four tumblerfuls) of milk, one quarter of a pound of fresh unsalted butter, or one eighth of a pound of butter and an extra quart of milk, two rolls or four medium thick slices of white bread, one quarter of a pound of baker's cake or crackers, one half pint of fresh cream, and one quarter of a pound of cereals.

On this four meal a day plan with the interval feedings I use eight powders each taken one hour after a feeding of any kind. During this first month out of bed the activities of the individual are restricted, this with the initial bed treatment taking eight weeks.

After the eighth week the eight, twelve, four and eight o'clock meals are diversified with the following selections, plain milk being taken midway between meals and the alkaline powders one hour after each feeding: Purees or creamed soups (barley, rice, peas, beans, celery); gruels (flour, cracker, barley, indian meal, farina). Plain crackers, baker's cake, pound cake, toast, rolls, jellies, rice, tapioca; ground or mashed vegetables; puddings, rice, tapioca, bread, cracker; custards, vanilla and chocolate, blanc mange, whips, and souffles; gelatines, plain ice cream, malt, milk cocoa, cocoa and chocolate.

This is kept up for four months when the following diet is prescribed and the powders changed to a combination of the two which were used before. The following is the combination which is used most frequently:

Magnesia usta
Bismuthi subcarbonatis
Sodium bicarbonatum .... āā 15.0
Sacchari lactis
Fiat pulv.
Sig.: Take a teaspoonful in water after meals.

The general plan of the diet is to take three moderate sized meals at regular intervals during the day, and to take supplemental meals of milk, reenforced with cream, cocoa and crackers between meals and before retiring. Altogether food should be taken at least five times during the day. All of the solid foods should be tender, cut very fine on the plate and thoroughly masticated before swallowing. Olive oil may be taken before the main meals in hypersecretion and hypermotility.

Foods permitted for main meals are: beef, lamb, and chicken, roasted or broiled and taken only once a day; fish, any kind and in any form excepting fried, taken once a day; eggs in any form, other than fried, and taken once a day; cereals (with the exception of oatmeal and shredded wheat biscuits) well cooked and taken with cream in the mornings; vegetables, any that are well cooked and mashed with the exception of green vegetables; tubers, such as baked or well mashed white potatoes, squash, parsnips and turnips; desserts, any made of milk, cereals and jellies, no fruits, berries or nuts. Butter, cream, milk and cereals and eggs still remain the main foods of the daily diet. If the symptoms become marked again these should be the main articles of the diet for a while, when the more general plan may be followed. The best drink at the meals is vichy or any alkaline water.

At the end of six months a normal diet is employed. The following list of foods that will be especially injurious and must not be eaten is given to the patient:

One or two minute cooked breakfast foods; rough vegetables such as cabbage, sprouts, cauliflower, artichokes, asparagus, beets, celery, corn, cucumbers, kohlrabi, onions and tomatoes; foods which contain pits, seeds or skins, or nuts; canned or smoked meats or fish; lobster, crab, shrimp;

cheese of any kind excepting cream cheese; too much pastry, especially that cooked in molten fat, such as doughnuts and fritters; foods that are too sweet, such as jams; fruits such as cherries, cranberries, figs, grapes, musk melons; coffee, strong tea, alcoholic and malt beverages.

During the second month x ray treatments are given to the stomach, these usually being six in number, given at five day intervals. The patient is x rayed on an empty stomach which contains two ounces of bismuth subcarbonate. The exposure at twenty-four inch distance is one minute, five to ten milliamperes, five inch spark gap, two millimeters of aluminum and a thickness of sole leather used as filters. Occasionally some form of organic iron is taken by mouth or a ferruginous preparation by hypodermic injections.

REFERENCES.

1. BASSLER: *Diseases of the Stomach and Upper Alimentary Tract*, first edition, 1910.

Some Difficulties in the Diagnosis of Peptic Ulcer*

By A. WIESE HAMMER, M.D., F.A.C.S.,
Philadelphia.

The correct diagnosis of peptic ulcer is beset with many difficulties, and surgical authorities are widely at variance as to the proportion between the number of gastric and duodenal ulcers encountered. Moynihan (1) asserts that more errors are made in the diagnosis of gastric ulcer than in that of any other abdominal disorder. He says that duodenal ulcer is most often found in place of gastric ulcer and that not infrequently gallstones are found when a gastric ulcer has been diagnosed. He believes gastric ulcer to be rather rare, and that the x rays and operative measures are alone corroborative means of diagnosis. There is, as may readily be imagined, a variety of conflicting statistics on the subject, but by far the greatest number of ulcers are of the duodenal type, in the proportion of about three to one.

In a study of a series of nearly three thousand cases of duodenal and gastric ulcer, Graham (2) asserts that duodenal ulcers have a longer course in years than do those of the gastric type, because duodenal ulcers do not enjoy the chance of latency encountered in gastric ulcers. The history of ulcer extending over a long period of time favors the duodenum as the seat of the process. In this ulcer hemorrhage is less common than in the gastric variety. In duodenal ulcer, night pains are usual, so that this variety is often confused with cholelithiasis. On the other hand, in gastric ulcer bloating is more frequent and coarse and large amounts of food are more likely to produce pain than in duodenal ulcer. Continuous symptoms are characteristic of gastric ulcer only. Hence the great difficulty of diagnosis in the different varieties of peptic ulcer. The x ray is an invaluable adjunct in the diagnosis.

These statements may not appear to the examining physician as possessing value, not because they are not clear, but because they contain nothing tangible to guide him in making a diagnosis. And that is just where the difficulty lies; there are no fixed lines to guide in the diagnosis and differential diagnosis of peptic ulcer. Moynihan, in his monograph on duodenal ulcer, asserts that chronic hyperacidity is an indication of duodenal ulcer, but that is only in uncomplicated and early cases. The more chronic cases cannot be detected in this way. "We know now," says Eggleston, "that a number of abdominal disturbances reflexly disturb the function of the stomach and its chemistry and cause symptoms that closely simulate those of duodenal ulcer. For this reason a diagnosis of peptic ulcer should not be made without exceedingly painstaking study. Not only should a careful history be taken and a thorough physical examination made, but, in addition, the patient should have the benefit of laboratory study and, whenever possible, a thorough x ray examination of the gastrointestinal tract. Even then a small percentage of unavoidable errors will result."

SYMPTOMATOLOGY.

The symptomatology of duodenal ulcer is analogous to that of gastric ulcer. But in gastric ulcer, as distinguished from the duodenal, the pain occurs earlier in the course of digestion, and is intensified by a full meal, especially where coarse foods or those difficult of digestion are partaken.

Mayo Robson believes that any one or all of the cardinal symptoms of gastric ulcer may be wanting. He says that he has frequently operated for gastric ulcer where pain was not a conspicuous symptom, where hematemesis had been entirely absent, and vomiting had not come on until stenosis of the pylorus had produced dilatation.

The pain is usually referred to the epigastrium, whence it may radiate in various directions though, as a rule, it is toward the left subscapular region. Food usually increases the intensity of the pain, and the time of its onset, after the ingestion of food, is frequently indicative of the site of the ulcer. If the ulcer is in the location of the cardia or along the lesser curvature, pain is evidenced shortly after the taking of food, or within a half hour. If the ulcer is at or near the pylorus, the pain is experienced one, two or even three hours after food is taken, whereas the pain is usually, although not necessarily, later in appearing in the duodenal ulcer, and is usually relieved by taking food.

Robson also calls attention to the fact that as digestion is frequently delayed in the evening, pain of this character usually awakens the patient around the hour of midnight; a circumstance that is quite common in gallstones, when many of the other symptoms are absent. He also emphasizes the fact that epigastric pain is usually well marked with rigidity of the recti and may be strictly localized or widely diffused, a specially tender spot often being found in the dorsal region, a little to the left of the spine, opposite the ninth and tenth dorsal vertebræ.

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Late in the course of gastric ulcer complications may arise, which include perforations; adhesions; contractures; dilatation of the stomach due to obstruction; and fistulæ between the stomach and pylorus with adjoining organs or on the surface of the body; local peritonitis, ending in adhesions, suppuration and a localized abscess; abscess of the liver, pancreas or spleen; pressure on or stricture of the bile ducts producing jaundice. There is a type of ulcer to which the name penetrating is employed in contradistinction to perforating, and in this connection Eggleston remarks (3):

"More than ten per cent. of our gastric ulcers were found to be what we have chosen to designate as penetrating ulcer, using this term in contradistinction to chronic perforating ulcer. A penetrating ulcer is one that has burrowed through the posterior stomach wall into the neighboring organs or tissues, usually the liver or spleen. In a sense it is a perforating ulcer, but is so surrounded by adhesions as to prevent the serious consequences which, in perforating ulcer, follow the escape of stomach and duodenal contents into the abdominal cavity. The penetrating ulcer is distinguished clinically, by greater severity of pain, greater local tenderness and the absence of relief after the ingestion of food and alkalies, as is found in the typical simple ulcer. It would seem that the active peristalsis set up following the ingestion of food is as largely responsible for the pain as is the increased acidity."

Perforation of a gastric ulcer is a matter of gravest importance. The force of this statement is apparent when it is recalled that ninety-five per cent. of cases result fatally unless treated surgically at once. In acute perforation, the stomach contents are emptied into the peritoneal cavity; in subacute, the stomach is empty, the ulcerous opening is small, and the opening becomes partly or wholly occluded by a layer of plastic lymph. Medical treatment is sometimes efficacious in the subacute variety. The acute and subacute perforations in gastric ulcer are most common upon the anterior wall. The chronic form of gastric perforation is more likely to occur through the posterior wall, in which perforation occurs into the peritoneum, protected by adhesions due to a previous inflammation.

The prognosis in perforating ulcer depends upon the interval between the time of perforation and of operation, upon the size and character of perforation, and whether the stomach is full or empty. In 1910, Moynihan reported twenty-four operations for perforation, sixteen from ulcer of the stomach and eight from ulcers of the duodenum, with fifteen recoveries, showing a mortality of 37.5 per cent.

Hemorrhage, as a rule, is not fatal, but its occurrence mentally depresses the patient. The amount of hemorrhage offers no idea of the size of the bloodvessel eroded. Where a solitary ulcer exists hemorrhage is rarely fatal. Large hemorrhages frequently repeated at short intervals offer a grave prognosis. Parenthetically, it should be remarked that, in addition to gastroenterostomy, the ulcer should be resected, cauterized or infolded with an infolding of the peritoneum. With the march of modern surgery, the dangers of secondary anemia are obviated through the intervention of transfusion. Formerly this anemia was the bane of the surgeon because of the impossibility of meeting the secondary condition by means of forced feeding.

Although ulcers occur far more frequently upon the posterior wall, perforations are far more common upon the anterior. And again, although more than eighty per cent. of all cases of perforation of gastric ulcer occur in females, especially around the age of twenty-five, nevertheless, the number of perforations is relatively more frequent in men, especially above the age of forty (Mayo Robson).

The chronicity of the ulcer is a subject of much interest and importance and Gruber asserts that in at least seventy-five per cent. of cases of chronic duodenal ulcer, the patients never consult a physician (4). Their cases are never diagnosed and they refer to their condition as chronic dyspepsia. Eggleston (5) believes that the relief obtained from the large number of proprietary remedies commended by victims of ulcer, is largely due to the alkalies contained in them, especially the bicarbonate of soda, which temporarily alleviates the pain in these cases. He asserts that probably thirty per cent. of these persons suffer from peptic ulcer. This affection yields probably more completely than any other organic condition to therapeutic measures. In the cases reported, eighty-five per cent. of the patients under medical treatment are regarded as cured. These socalled cures last from days to months, during which time there is absence of gastric pain, indigestion, and occult blood. The recurrence of the symptoms is interpreted as the formation of a new ulcer rather than a relapse of the former one. The x rays have exposed this fallacy, showing that months or even years may elapse without complete healing.

There are cases included under this head which are extremely difficult of diagnosis and offer so peculiar a symptomatology that their true nature is often overlooked. These ulcers are of the pyloric, duodenal or gastric type and seem to give little clue, except for their perforating tendencies. The subject has been most elaborately studied by Graham (6) of the Mayo Clinic, and some of his valuable deductions are incorporated in the statements which follow.

Often the only symptom complained of in ulcer is the sudden, acute, short attacks of epigastric pain, rarely radiating in character, but which may radiate to the back if posterior perforation is impending. Recovery from the pain is usually sudden and complete, so that without resort to the rays, apparently the most rational, though erroneous, diagnosis is gallstones. Vague symptoms may point to the liver, while the gastric disturbance predominates. Whereas the symptoms manifested, that is, pain, gas and vomiting, are usually indicative of the true condition, in a great number of cases the pain bears no relation to the ingestion of food, in fact, it is quite independent of food, is not caused or relieved by it, and the gas intensifies the distress.

In another class of cases there are mild digestive disturbances, often quite disregarded by both physician and patient. There is slight distention from gas, slight regurgitation, or vomiting.

The other class of cases is that of chronic gallbladder disease, with adhesions, duct obstruction, contraction, perforation and perhaps pancreatitis. When any of these conditions are present, the symptomatology is quite analogous to that of chronic gastric ulcer with perforation.

A diagnosis of ulcer is favored if the symptoms first assert themselves when the patient is from fifteen to thirty years of age. Occurring later in life, the presence of gallstones is more likely. When the attacks of pain follow such other at short intervals and are repeated from day to day, even when acute, the diagnosis is to be guarded. It is much oftener ulcer with perforation than gallstones.

With the occurrence of acute pain, night after night, and with constant distress and general gastric disturbance, the probable diagnosis is ulcer, unless hectic symptoms should supervene. Even in a patient past the age of thirty-five or forty, who has these symptoms, in the absence of fever, chills, sweats and jaundice, the probable diagnosis is ulcer.

Pain that comes on immediately after taking food and is unrelieved by an alkali also brings into consideration the subjects of appendicitis and cholecystitis. In the presence of the symptoms of irregular food distress, or pain, anorexia, gas and vomiting, the likelihood of appendicitis should not be forgotten.

The clinical picture presented by peptic ulcer is anything but a uniform one, and the not infrequent peculiar symptoms presented allow of wide and varying interpretation. With so much confusion likely to arise in the minds of the best clinicians, it becomes the paramount duty of every conscientious physician and surgeon to resort to the x rays as a constant routine in the study of this important class of cases, the rays being of the ultmost importance in the differential diagnosis of peptic ulcer.

REFERENCES.

1. Moynihan, B.: *British Medical Journal*, December 13, 1919.
2. Graham, C.: *Colorado Medicine*, vol. xv, 1918.
3. Eggleston, Elmer E.: *Journal A. M. A.*, vol. lxxv, No. 23, December 4, 1920.
4. Gruber, G. B.: *Mitt a. d. Grenzgeb. d. Med. u. Chir.*, vol, lxxxii, 1912.
5. Eggleston, Elmer E.: *Journal A. M. A.*, vol. lxxv, 1920.
6. Graham, C.: *Colorado Medicine*, vol. xv, 1918.

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Acute Perforation of Gastric and Duodenal Ulcer*

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Acute perforation of an ulcer of the stomach or duodenum is not an everyday occurrence, nevertheless it is frequent enough to demand our serious attention. This is especially true because it is a curable condition and its cure depends upon its early recognition. In 59,450 autopsies Bassler (1) found ulcer of the stomach or duodenum in four and four tenths per cent. Of these, five per cent. were perforated. In 543 consecutive operations for ulcer of the duodenum or stomach, Mayo (2) found twenty-seven perforations. Davis (3) gives still higher figures, asserting that twenty per cent. of all duodenal and seven per cent. of all gastric ulcers perforate. Musser (4) found twenty-eight and one tenth per cent. of perforations in 1,800 cases. Gibson (5) believes that next to appendicitis and intestinal obstruction, perforation is one of the most frequent acute abdominal conditions.

Why and when do ulcers of the stomach or duodenum perforate? When we consider the thinness of the walls of these viscera, it is readily seen how easy it is for an already existing ulcer to perforate, whenever there is a tendency to grow rather than to heal. And as long as the conditions which are responsible for the ulcer in the first place continue, that tendency is present. In fact, it is strange that these ulcers do not come to perforation more frequently. As to the immediate cause of the actual perforation, the most common is overloading of the stomach, causing undue stretching. Next to this is trauma that causes a pull or a blow on the weakened wall. Thus we see perforation occurring frequently after a hearty meal or while the patient is engaged in some strenuous work or exercise.

In our series, one case of perforation occurred after eating, one while the patient was working on the farm, one while the patient was working as a carpenter, and one during vomiting caused by the original ulcer. In the fifth case, however, perforation occurred while the patient was in bed, early in the morning, with the stomach empty. A study of the literature shows that such occurrences are not uncommon. In other words, an ulcer of the stomach or duodenum may perforate at any time.

The age of patients with perforation varies considerably. In Hertz's series (6) of sixty cases, it varied from sixteen to seventy-five; in Wise's series (7) from twenty-six to fifty-seven; in Gibson's cases (5) the average age was thirty-five. In our series, the ages were fifty-three, seventy, sixty, fifty-seven and twenty-three.

It is much more common in men than in women; forty-three out of sixty, eight out of nine, fourteen out of fourteen, are the proportion of men in different series reported. Our cases were all in men.

The proportion of gastric to duodenal ulcers varies greatly in different reports. Farr (8) reports more gastric than duodenal perforations in twenty-four cases; Hertz reports forty-seven gastric and thirteen duodenal cases; Petrén (9) sixty-five gastric and twenty-seven duodenal cases, while Struthers (10) reports only eighteen gastric as against seventy-two duodenal cases; Wise (7) four gastric and five duodenal cases; Gibson (5) seven gastric and seven duodenal cases. In our five cases, all were duodenal perforations.

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The existence of other ulcers beside the one that has perforated must be kept in mind. Petrén (9) reported several ulcers present in twenty-seven per cent. of his cases. It is for this reason that gastro-enterostomy is urged by many in every case. Perforation of more than one ulcer at the same time is rare. Eliot (11) has collected twenty-six such cases of multiple perforation from all the literature.

The diagnosis of perforation is not made by observing a large number of symptoms or signs, but the few symptoms that are present are so striking and definite that a diagnosis in the beginning is not difficult. The two principal symptoms are pain and rigidity, the former evident to the patient, the latter to the examining physician.

The pain, like that of the rupture of any hollow viscus, is characterized by its suddenness of onset and its excruciating character. It is so severe that the patient at once drops any activity in which he is engaged and holds himself in a strained immovable position, fearful of increasing the pain by any movement. In one of our cases the patient was standing in a stooped position and it was impossible to get him to lie down in order to be examined. It is continuous, which differentiates it from the colicky pains of intestinal obstruction or acute indigestion. The pain at first is epigastric in its location, a little to the right of the centre if duodenal, central or nearly so if gastric. Soon the pain travels down the right side toward the right iliac fossa in the case of duodenal ulcer and that is why many of these cases are diagnosed as appendicitis. In fact, after peritonitis has developed, especially if there is not a clear history of the onset, it is almost impossible to make a diagnosis. In the case of a gastric ulcer away from the pylorus, leakage occurs down the left side of the abdomen and the pain is there rather than on the right side.

The second symptom and that which is most evident to the examining physician, is rigidity. The abdomen is as hard as a board and often scaphoid in shape and the rigidity is a little more marked in the epigastric region at the beginning, a little later along the right side, but soon becomes general.

These two symptoms, the sudden excruciating pain in the epigastrium and the boardlike rigidity of the abdomen, are almost sufficient to make the diagnosis of perforation of a gastric or duodenal ulcer.

Usually there is a history of indigestion preceding the perforation due to the presence of the ulcer that perforated. When this history is obtained, it greatly helps in confirming the diagnosis, but if it is absent, it does not necessarily exclude perforation, as this indigestion is not always present before perforation. Muller and Ravdin (17) report fifteen cases of perforated gastric ulcer, in four of which perforation was the first sign of abdominal pathology. Hammond (18) reports fourteen cases with no history of dyspepsia. In our series, indigestion had been present in every case.

Another symptom that is usually present is vomiting. It is not, however, a striking symptom, usually occurring only a few times and in some cases absent altogether, especially in the first hours, before peritonitis has developed. In two of our cases there was no vomiting whatever.

Dullness in the flank is a valuable symptom, but this occurs only when sufficient stomach contents have leaked into the abdomen. It is found mostly in the right flank, especially in duodenal perforations, and disappears when the patient lies on his left side. The longer the perforation exists the more marked it becomes, but, of course, should never be waited for. Its presence is confirmatory, but its absence does not exclude perforation.

As to absence of liver dullness, that is a symptom always mentioned in the textbooks, but as a matter of fact it seldom exists, except in a large perforation in late cases. It certainly is an exceptional and unreliable symptom. Gibson says he did not find it in his series of fourteen cases and we did not find it in any of our own cases.

The absence of any elevation of temperature or increase of pulse during the first hours is an important point to remember, as it is likely to deceive the physician into thinking that the condition is not a serious one. The temperature and pulse in our own cases, when first seen, was as follows: Temperature 98°, pulse 60, four hours after perforation; temperature 98°, pulse 76, one hour after; and temperature 98° by rectum and pulse 76, three hours after; temperature 99°, pulse 76, about five hours after; temperature 98°, pulse 64, four hours after; temperature 98°, pulse 96, seven hours after perforation.

A blood count was done in only one of our cases before operation, in which case there was a leucocytosis of 15,000 with ninety per cent. polynuclears. The high percentage of polynuclears in an acute abdomen would indicate a serious condition requiring operation, as first shown by Sondern (12) and Gibson (13) and verified by a study which I made in 1908.

To recapitulate, the cardinal symptoms of perforation of gastric or duodenal ulcer are sudden excruciating pain in the epigastrium accompanied by boardlike rigidity of the abdominal wall, usually preceded by a period of indigestion.

The conditions from which acute perforation must be differentiated are acute indigestion, appendicitis, cholecystitis, pancreatitis, and intestinal obstruction.

The pain of acute indigestion usually comes on suddenly, commonly in the middle of the night, is often epigastric, and generally accompanied by vomiting. But it is intermittent in character, and although the abdomen is held rigidly during the pains, in the intervals it relaxes and becomes soft.

Most commonly perforation is confused with appendicitis, and to do so is a serious mistake, for it means an incision in the lower part of the abdomen, and then, if the diagnosis is made, a second one in the upper part. In the beginning, the differential diagnosis is easy, for the pain of appendicitis, even though often beginning in the epigastrium, is lower, the tenderness and rigidity are in the right iliac fossa, and the temperature and pulse are increased. Later, however, especially in a duodenal perforation, when the leakage has reached the right iliac fossa, it becomes much more difficult, and after a general peritonitis has been established, it is impossible to differentiate the two conditions, unless there is a very clear history of its onset.

I remember two cases of general peritonitis, seen very late with both patients *in extremis* and without a clear history, where it was impossible to determine the cause of the peritonitis. On account of the much greater frequency of appendicitis, incision and drainage were made in the lower right side, but in each case the appendix was not sufficiently diseased to account for the peritonitis. It is possible that in one or both of these cases there was a perforation, but as autopsy was absolutely refused, the cause was not found. All this emphasizes the importance of making an early diagnosis. The physician who first sees the case has the greatest responsibility, and, if he makes the diagnosis, deserves just as much credit for saving the patient's life as the surgeon who operates.

Fortunately the other conditions with which perforation may be confused usually also require early operation through a high incision, so that no great harm is done if the exact diagnosis is not made before operation. In severe or gangrenous cholecystitis, the pain is further to the right and the rigidity is more circumscribed. Acute pancreatitis may simulate perforation very closely, of the duodenum, if in the head, and of the stomach, if in the body or tail. On opening the abdomen, the diagnosis can usually be made, the fluid contents in the case of the pancreatitis being dark colored and small areas of fat necrosis usually being present in the omentum. Perforation sometimes markedly resembles intestinal obstruction and in one of our cases this diagnosis was first made, but corrected before operation.

The treatment of perforation is exclusively surgical and without it the mortality is practically one hundred per cent. We can imagine that a piece of omentum or a plug of fibrin might become lodged over the opening, thus closing the perforation and curing the patient for the time being. Shoemaker reports such a case, in which the patient was operated upon six days after the perforation. But this is so rare that it should be absolutely disregarded in considering the treatment of these cases. Or the perforation may become adherent to the liver, as in one of our cases, with subsequent leakage and peritonitis.

The operative treatment consists in opening the abdomen through an upper right rectus incision and closing the perforation. As most of the perforations are on the anterior surface of the first portion of the duodenum or pyloric portion of the stomach, these parts should be inspected first. I have found that the best and quickest way to find these parts is to follow the gallbladder to its neck, which lies next to the first portion of the duodenum. If the perforation is not found here, then the lesser curvature, and finally the greater curvature should be examined.

The gap is best closed by a pursestring or a row of interrupted sutures, and buried by a second pursestring or second row of Lembert sutures using linen or chromic catgut, bringing as much healthy peritoneal surface together as possible without causing obstruction. This is sometimes difficult in large or indurated ulcers. The omentum may then be sewed over the wound, often by sewing the lesser to the greater omentum. Where it is impossible to sew the edges of the gap together, an adjacent viscus or a piece of omentum may be sewed over the opening, and it has even been suggested to tampon or place a catheter directly into the opening and surround it with omentum, thus forming a temporary fistula.

There are three steps often taken in the operative treatment concerning which there is considerable disagreement. They are excision of the ulcer, gastroenterostomy, and drainage.

As to excision of the perforating ulcer, that is advised because it is supposed to remove the ulcer entirely and thus avoid any danger of secondary perforation. As a matter of fact, in those cases in which secondary operations or autopsies were done some time after simple suture, the ulcers were found to be perfectly healed, while secondary perforation was usually due to another coexisting ulcer and not to the original one. Consequently it seems like poor judgment to subject the patient to the added risk of an excision for a very doubtful benefit.

Gastroenterostomy after closure of the perforation is strongly advocated by many surgeons, to overcome the supposed obstruction caused by infolding of the edges of the perforation and to bring on a cure of the original or any coexistent ulcer, thus preventing secondary perforation or hemorrhage. Deaver (15) does a gastroenterostomy in every case. Richter (16) asserts that if the perforation is properly closed it must cause an obstruction. On the other hand, Gibson (5) shows that results after gastroenterostomy are not so good as without it and that actual obstruction very rarely occurs. Eliot (11) has made some experiments on cats, showing that when portions of duodenum were excised up to two thirds of the circumference, and the duodenum then sewed up, no obstruction developed, the stomach did not become dilated, and the narrowed portion of the duodenum later became dilated. When we consider that perforation is a desperate condition causing any prolongation of the operation to be of most serious consequence; that gastroenterostomy is a procedure of considerable magnitude; that it must be done in an infected field; that in itself it is prone to later complications, such as jejunal ulcer, we are forced to the conclusion that the patient's chances of recovery are much better without a gastroenterostomy. The only exception to this rule would be those cases where the obstruction is obviously too great to allow the gases and fluid chyme to pass through. Furthermore, if the patient continues to suffer from symptoms of ulcer, a secondary gastroenterostomy can be done later with much more safety. In this way we operate for a desperate condition in two stages, just as we have learned to do in other desperate conditions, reducing our deathrate considerably. In none of our cases was a gastroenterostomy done and we had no cause to regret the omission.

The question of drainage cannot be answered yes or no; but must be decided in each individual case. In a study of the literature, however, one is struck by the growing tendency not to drain in most cases. The stomach and duodenal contents are sterile and the peritonitis at first is a chemical one rather than infectious. Where there are gross stomach contents in the abdomen or there is a well advanced peritonitis, drainage is advisable, sometimes through a stab wound in the lower part of the abdomen. In all other cases, however, patients make a very satisfactory recovery without drainage. Two of our cases were drained and two were not.

What is the prognosis of perforation of the stomach or duodenum? This cannot be determined with any degree of accuracy, as undoubtedly many cases are not recognized. But of the cases diagnosed and operated in, a sufficiently large number have been reported to give a fair idea of the prognosis. A study of these cases forces one to the conclusion that a favorable prognosis is determined more by early diagnosis and operation than by any other factor, even including the skill of the surgeon and the method of operation used. Thus Hertz (6), in a series of nineteen cases operated in six hours or less after perforation, had seventy-five per cent. of recoveries; in a series of twelve cases operated in between six and twelve hours after perforation he had sixty-six per cent. of recoveries; and in a series of twenty-two cases operated in more than twelve hours after perforation, there were only twenty per cent. of recoveries. In the series of fourteen cases operated in by Gibson (5), the only fatal case had perforated thirty-six hours before operation. In our own series, the four patients operated upon were fortunately seen early and operated upon between five and twelve hours after perforation. All of them recovered.

In all cases of sudden and acute pain in the abdomen, the possibility of a perforation of a gastric or duodenal ulcer should be carefully considered. If a diagnosis of this condition is made, operation should be done with the least possible delay. In the beginning and with proper treatment, acute perforation has a small mortality. When operation is delayed or omitted, perforation is a most serious and tragic condition.

RÉSUMÉ OF OUR OWN SERIES OF FIVE CASES.

All these cases were preceded by a period of indigestion and all were in men. In one case operation was refused. The patient was a man seventy years of age, who had just recovered from a prostatectomy done several months before and was a very poor risk on account of his age and its attendant complications. Perhaps we did not urge operation sufficiently. At any rate, the family was opposed to any further surgical intervention and he died twenty-two hours after perforation. The diagnosis was verified by autopsy, showing large perforated ulcer of the duodenum partly adherent to the under surface of the liver.

In the other four cases the first patient was operated upon by Dr. William Mansperger, the rest by me. The diagnosis was made in each case, though not without fear and trembling. Nevertheless, we were sufficiently convinced to make a high right rectus incision in each case. Operation was done, respectively, ten hours, four hours, twelve hours and six hours after perforation. Two of the cases were drained and two were not. None of the ulcers were excised and gastroenterostomy was not done in any case. The size of the perforations was from one eighth to one quarter of an inch in diameter. The average stay in the hospital was twenty days.

All four patients have been traced. The first one, operated upon in 1913, was entirely relieved of pain, and worked as a carpenter until 1919, when his abdomen became distended with fluid. He came in from the country to be tapped, after which he was quite well again and worked almost to the day of his death one year later. His death was said to have been due to myocarditis from which he had suffered for years. The fluid in his abdomen apparently had no relation to the former ulcer. The remaining three patients are all alive and well today. One, operated upon in 1917, is working as a carpenter every day. His only complaint is an occasional slight pressure in the epigastrium.

The next patient, operated upon in 1918, is working a large farm today and says he never felt better in his life. The last patient was operated upon in June and in a letter dated August 29, 1921, writes: "I have never felt better in my life. Nothing I eat bothers me."

In no series of cases do we feel so positive that surgery has saved lives that otherwise would surely have been lost as in these case of acute perforation of gastric or duodenal ulcer.

REFERENCES.

1. Bassler, A.: Diseases of Stomach, *Sajous's Cyclopedia*, vol. viii, p. 373.
2. Mayo, W. J.: Quoted in Warbasse's *Surgical Treatment*, vol. ii, p. 726
3. Davis, B. B.: Perforations of Gastric and Duodenal Ulcers, *Surgery, Gynecology, and Obstetrics*, vol. xxv, p. 162, 1917.
4. Musser: Quoted by Wise, *ibid*, vol. xvii, p. 377, 1913.
5. Gibson, C. L.: End Results of Fourteen Operations for Perforated Gastric and Duodenal Ulcers, *ibid*, vol. xxii, p. 388, 1916.
6. Hertz, H.: Perforated Gastric and Duodenal Ulcer, *Ugeskrift for Laeger*, Copenhagen, vol. lxxx, p. 1801, 1918.
7. Wise, W. D.: Acute Perforating Gastric and Duodenal Ulcer, *Surgery, Gynecology, and Obstetrics*, vol. xvii, p. 377, 1913.
8. Farr, E. E.: *Annals of Surgery*, vol. lxxii, p. 591, 1920.
9. Petren: *Beitrag. z. klin. Chir*, vol. lxxii, p. 319.
10. Struthers, J. W.: *Edinburgh Medical Journal*, vol. xxiv, p. 248, 1920.
11. Eliot, Ellsworth, Jr.: Perforated Gastric and Duodenal Ulcers, *Annals of Surgery*, vol. lv, p. 547, 1912.
12. Sondern, F. E.: The Value of the Differential Leucocyte Count in Diagnosis, *American Journal of the Medical Sciences*, December, 1906.
13. Gibson, C. L.: The Value of the Differential Leucocyte Count in Acute Surgical Conditions, *Annals of Surgery*, April, 1906.
14. Noehren, A. H.: The Value of the Differential Leucocyte Count in Acute Appendicitis, *ibid. February*, 1908.
15. Deaver, J. B.: *Ibid*, vol. xlvii, p. 894.
16. Richter, H. M.: Perforated Gastric and Duodenal Ulcers, *Surgery, Gynecology, and Obstetrics*, vol. xxviii, p. 399, 1919.
17. Muller and Ravdin: *Annals of Surgery*, August, 1921.
18. Hammond: Medical Society of the State of Pennsylvania, Philadelphia, 1921.

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The Problems and the Progress of Gastric Ulcer Surgery

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The problems of ulcer of the stomach and duodenum are at the moment most disturbing. The details and, indeed, the very basis of etiology are unsettled. But new light is being shed on the subject by a multitude of workers and the difficulties of the topic have been pressed back to the discovery of ways of decreasing the number of failures in operative treatment and to the lowering of mortality to the last degree; for we have passed many of the milestones on the way to the ideal management of the disease.

A. Kocher has suggested that the statistics of some of the large European clinics, where radical measures are required for the cure of ulcer, must be studied with the fact in mind that malnutrition is general because the populace, even today, is fed inadequately and in unaccustomed ways. He intimates that where the dietary is thus limited, gastroenterostomy may not suffice for cure and that the various types of resection or excision may be needed. A writer (1) discusses the reasons for the increased frequency of gastric disease since the war and gives an extended bibliography of the subject.

H. J. Paterson, of London, regards the discharge of the alkaline jejunal juices into the stomach as the important favorable factor in ulcer healing after gastroenterostomy. Jaruo and Vandorsky (2) state that during the fasting stage of the stomach's life, waves of reversed peristaltic action carry into the stomach duodenal contents.

There is a school of workers in gastric surgery who consider that the influences of nerve action are important in the production and maintenance of ulcers. W. Braun, of Berlin (3), says: "I have tried in recent times with such patients (that is, in those cases where there existed no distinct indication for a positive procedure) the simple transection of adhesions by the complete isolation of the pyloric part of the stomach and duodenum from its vessels and nerves in the hope of better combatting the phenomena of irritation." Although his work is too recent for full estimation, Braun is encouraged, by the condition of his patients thus far, to consider that neural influences are of great importance in gastric ulcer.

H. J. Paterson's study of the operative treatment of ulceration leads him to make the following assertions: First, occlusion of the pylorus is an unnecessary complication of gastrojejunostomy and is based on erroneous pathology. Secondly, if gastrojejunostomy is a physiological operation, then it is as efficient a treatment for ulcers of the body of the stomach as for ulcers near the pylorus: in other words, gastrojejunostomy is preferable to excision.

Brütt, of the Hamburg clinic (4), concludes a careful study of a great series of cases as follows:

1. As well in the fixing of indications for operative intervention in general as in the choice of the method is not only the momentary operative success to be considered, but also, in the first line, the remote result after the operation.

2. In callous ulcer remote from the pylorus, even when it occurs with penetration, operation is indicated, in general even if the patient finds himself in an interval free from complaint. The socalled successes with internal treatment in this form of ulcer are only transitory, in the best case the ulcer is carried over for a time in a state of latency.

3. The method of choice in callous ulcers remote from the pylorus is for us resection, best in the form of socalled transverse resection; with good technic and careful choice of cases the operative mortality is not much higher than in gastroenterostomy (according to our experience five per cent. mortality in transverse section against four per cent. in gastroenterostomy), yet the permanent results are essentially better. A number of the gastroenterostomized cases [in pylorus] of remote and penetrating ulcer end fatally sooner or later. Billroth's second method and its modifications show a considerably higher operative mortality than transverse resection. They are only to be brought into application when the transverse resection is impossible, where considerable difference exists in the width of the gastric stumps after resection. Moreover, transverse section produces relations which go far toward simulating normal gastric relations.

In ulcer near the pylorus and in cicatricial pyloric stenosis we cling fast to gastroenterostomy as the normal procedure, under some conditions, in connection with pyloric closure. But the low mortality is offset by later complications.

Considerable opposition to simple transverse resection has developed during recent years partly on account of the mortality which is usually too high to weigh properly against the comparatively minor disabilities and dangers of gastric ulcer. Bier states that he has not been very fortunate with direct resection. He seems to prefer the second Billroth method but he describes and beautifully illustrates both methods in his book (5).

The place of gastroenterostomy in the treatment of ulcers has undergone marked changes during recent years. In the earlier years of its employment it was thought that its beneficent effects would extend to almost all ulcer cases. Today the heads of large and active clinics, though they differ in their statistics of cure and palliation, are agreed that the formation of the opening results in cure in a large number of cases, the remainder being only improved, some symptoms of ulcer persisting.

It is well worth noting that Wilensky and Crohn (6), who studied a small series of cases in which the patients had been operated upon for stomach diseases, considered that gastroenterostomy left the stomach definitely impaired in a large percentage of the cases. They think that if the organ is able to adjust itself to partial occlusion of its outlet where the stenosis comes about slowly, the making of a gastroenterostomy is then in place because an outlet for the stomach contents is provided. But, under the reverse conditions, far more harm than good is likely to result from making the opening. They strongly warn against the operation when stenosis is absent.

In America a modification of operative procedure employed to meet this difficulty has been that of local excision of the ulcer or cauterization of its base. The surgeons of the Mayo clinic have set the example.

Among thoughtful German surgeons, however, local excision has not met with so much favor as has the idea of the resection of the stomach wall, including the ulcer. But the technical difficulties are frequently great, chiefly because of the adhesive invasion of the neighboring structures, pancreas, colon, and other organs. The separation of adhesions and the obliteration of fistulæ are frequently both difficult and hazardous.

These difficulties can be overcome by great technical skill. Von Haberer has just reported a series of nearly a hundred gastric resections without a death and with satisfactory functional results. He uses the first Billroth method.

Kocher (7) has recently presented us with very timely, sensible and wise deductions from a large experience and much ripe thinking. The diagnosis of gastric ulcer in his clinic has reached remarkable precision. In eighty-six per cent. of his cases active ulcer was found at operation; in fourteen per cent. of the cases error was made only as to the ulcers that were healed with scars and adhesions persisting. In only two per cent. of the cases was entire absence of ulcer and scars noted.

The diagnosis between simple and callous ulcer can be made with great probability, but not with certainty. That method of treatment is most effective which brings about conditions which permanently act against the formation of ulcer.

From a consideration of the actual permanent results obtained by him with gastroenterostomy, Kocher presents seventy-eight and one seventh per cent. as very good; nine and one ninth per cent. of the cases gave good and in but seven and one fourth per cent. was the result of that operation unsatisfactory. So he thinks that in the greatest number of cases not only does healing occur but new ulcers are prevented from forming. He considers that a correctly applied and properly functionating gastroenterostomy remains permanently. The failures after this operation, he says, are due to the leaving of incorrect anatomical or functional conditions.

At the opposite pole of surgical therapy is the Vienna Breslau School. The treatment of ulcer of the stomach and of the duodenum by the application of the first Billroth method is recommended by Von Haberer, as already noted, for the most extended application. This operation consists in excision of the pylorus and part of the stomach, followed by direct suture, the redundant part of the gastric wound being sufficiently diminshed by suture at the side nearest the lesser curvature to provide conditions necessary for approximation.

Von Haberer considers it important to excise the pylorus and regards the reestablishment of gastric structure by the original Billroth plan as corresponding most closely with physiological requirements. Although this brilliant surgeon emphasizes the fact that his results may have to be viewed in another light after some years have passed, yet the results are indeed alluring at present. At the moment of making his last report he had operated on eighty cases without a death. The results as to function have been most gratifying. The stomach soon adapts itself to its new relations and there seems to be no trouble with ulcer recurrences.

The operation demands great technical skill on the part of the surgeon, far more than simple gastroenterostomy. Von Haberer's successful experience makes his technical remarks worthy of study, especially when he describes the first Billroth operation.

To the longitudinal incision he adds, where necessary, transverse cuts into or across the recti muscles. The abdomen opened, orientation is made, preferably without evisceration of the transverse colon. He considers postoperative pneumonias more likely to result from exposure and chilling of the viscera than from the anesthesia. The orientation is likely to be difficult on account of the adhesions and the penetration of the ulcerative process into the neighboring viscera. The transverse mesocolon is then incised to give access to the posterior wall of the stomach. Next the vessels of the lesser curvature are tied with great care and then those of the greater curvature. The pylorus may be freed in the same way. The hepatoduodenal region is also sutured, while the small bloodvessels about the duodenum are carefully tied. Von Haberer recommends leaving intact, as far as possible, the trunks of the upper and lower pancreaticoduodenal arteries. Furthermore, the serosa upon the posterior wall of the duodenum is to be spared, if possible, from all traumatism. Then comes mobilization of the duodenum which, practised according to the method of Kocher, does much to simplify the remainder of the intervention and to provide adequate mobilization which is important.

Next under clamp protection the condemned part of the stomach is removed and the cardia and duodenum are approximated together. Then follows mucous membrane suture, the seromuscular layer and finally the serosa. As previously stated the inequality of the duodenum and the stomach mass must be made good.

Eiselsberg discusses with masterly brevity and clearness the problems we are considering. He says: "The question which stands today at the focus of the operative treatment of gastric and duodenal ulcer is this: what kind of intervention appears indicated . . . simple gastroenterostomy, unilateral pyloric exclusion or, finally, resection? It is known that, in the course of years, many surgeons have given up gastroenterostomy and have replaced it by a more radical procedure. Recurrence of hemorrhage, above all the arising of that evil spirit of gastroenterostomy, peptic ulcer of the jejunum, to which, as is well known, attention was called at the congress more than two decades ago by H. Braun, have led to this."

He states that gastroenterostomy gives, in a considerable number of the cases, a satisfactory result; the prognosis being more favorable when obstruction exists at the pylorus and that the ulcers lying at a distance from the pylorus, though not anatomically influenced, can become clinically latent without losing their complicating dangers. Attention is to be called to the not unessential danger of a gastroenterostomy in cases presenting insufficient objective findings, since the conditions brought about by it lead with relative frequency, to peptic ulcer of the jejunum.

Pyloric exclusion, originated by Eiselsberg, the blocking of the pylorus as a passageway from the stomach to the duodenum with the simultaneous formation of a gastroenterostomy, promptly corrects the hemorrhages from ulcer. But it has the great disadvantage that ulcers more frequently recur than after simple gastroenterostomy. This is probably due to the pouring of acid juice into the bowel. So Eiselsberg, following the suggestion of his former pupil, Von Haberer, has decided for the present to reconsider the application of this procedure to the treatment of ulcer. But he hopes that modifications of gastroenterostomy will restore its usefulness. For example, the principle of longitudinal gastric reefing may be advantageous in that it diminishes the secretory power of the glands near the outlet of the stomach.

Transverse resection of the stomach for ulcer, he says, gives most satisfactory immediate results and the mortality is low in the hands of skilled surgeons, but in sixty-four cases of Eiselsberg, ulcer recurred nine times, and four of these patients had to be operated upon a second time.

Therefore Eiselsberg practised transverse excision of the ulcer bearing area with gastroenterostomy. This is Billroth's second method; but since Von Haberer has so successfully used Billroth's first method. Eiselsberg has substituted it. The first method of Billroth consists of excising, with reunion by directly suturing the duodenum into the lower portion of the wound in the stomach. He confirms Von Haberer's preliminary reports of successful results with low mortality.

Extensive excision of the acid producing portion of the stomach is regarded as important by many surgeons. Substitutes for this procedure have been presented in the extensive reefing or infolding of the organ already mentioned and in the section of the gastric wall down to the mucosa all about the ulcer bearing area with the purpose of diminishing the glandular activity.

Doege (9), of Wisconsin, writes intelligently on the choice of operative measures in gastric ulcer and decides in favor of pylorectomy with posterior gastroenterostomy. He boldly states that the cure of chronic gastric ulcer by gastroenterostomy alone is doubtful since that operation gives its best results in ulcers near the pylorus accompanied by stenosis. But in ulcers distant from the pylorus it gives only temporary benefit. He states that pylorectomy fulfills what he considers the principal requirement for the cure of gastric ulcer, i. e., the "removal of acidity," better than any other operation.

On the other side of the question is the very recent paper of Métraux, inspired by Roux (10) of Lausanne. Métraux recognizes that the tendency of most surgeons is towards direct attack upon the ulcer. Furthermore at a recent meeting of the French Congress of Surgeons, the conclusions of Duval in favor of Balfour's method of directly clearing out and sewing together the edges of the ulcer and of annular resection were accepted by a number of surgeons for whom extensive pylorogastrectomy constitutes the method of choice. Emphasizing the incontestible gravity of this operation in comparison with a benignant gastroenterostomy, Roux and Métraux consider that there is danger in thus allowing the field of the extensive interventions to enlarge. The study of the remote results to their patients causes them to conclude that simple gastroenterostomy should still be considered as meeting many indications.

Theoretically correct for simple pyloric obstruction is pyloroplasty by the Heinecke-Mikulicz method, consisting of longitudinal incision through the pylorus followed by suturing the wound in the same direction, but satisfactory functional results are not attained. Finney's operation, essentially plastic, is also unsatisfactory for a physiological outcome and seems to have no field of usefulness.

The rather extensive resection of the pylorus and the gastric antrum results well in practice. Of course no obstruction is left at the outlet of the stomach, and the removal of a part of the secreting structure of the organ must profoundly modify its function. The German savants have laid special stress upon the importance of nerve and blood supply and the resection of the outlet of the stomach and the antrum certainly accomplishes this purpose. Of course the evaluation of the changes produced belongs to the future.

The function of the resected stomach seems to be improved with surprising promptitude. The removal of the ulcer bearing part of the organ must be of great importance in the improvement of all relations.

It is generally admitted that gastroenterostomy improves the conditions under which healing may occur, but that it has no direct curative effect. Hence after this operation the care of the patient must still be the profound concern of the surgeon. The following case is an example:

CASE I.—Mrs. R., aged sixty years, five feet three inches in height, who had had gastric ulcer for many years may be considered. Entering the hospital at a weight of less than a hundred pounds, she had a cholecystectomy done together with a posterior gastroenterostomy. Her appetite returned at once and as soon as food could be taken in good quantity the weight began to increase rapidly. In ten weeks she weighed a hundred and twenty-eight pounds and was in excellent condition.

But when a barium buttermilk meal is given, although the fluid leaves the stomach at once and actively by the new opening as well as by the pylorus, the organ contains about a fourth of the meal at the end of six hours. The ptosis of the stomach was much improved and digestion is only rarely associated with the formation of gas. Evidently this woman needs medical treatment and management for a long time in order to ward off active recurrence of the ulcer symptoms. It seems probable that the condition will improve with time; the tonicity of the stomach should be largely regained. Ochsner is especially insistent with respect to the aftercare of gastroenterostomized patients. They should be under supervision for months if not for years.

No one can now lay down hard and fast rules on which the surgeon shall base his surgical practice in these cases. But considering that many American patients can have the benefit of selected food and good nursing and in many cases they submit to surgical intervention before operation has become a last resort, we may offer the following suggestions for guidance in steering a middle course between extremes:

1. Intelligent patients should be told that secondary operations must sometimes be done in order to give then the best chances for recovery under the application of the least radical modes of intervention.

2. Gastroenterostomy has its recognized place in ulcers near the pylorus with symptoms of obstruction, especially if the patient is well cared for afterwards.

3. Partial pylorogastrectomy after the first Billroth method should have place in callous ulcers, in ulcers remote from the pylorus, in multiple ulcers and in cases complicated by perforation and the penetration of the neighboring organs, if feasible.

4. In the great number of ulcer cases not falling within these classes, gastroenterostomy should be regarded as properly satisfying the surgical indications, although it is to be admitted that failure to secure full relief may be followed by the necessity for more radical subsequent intervention, i. e. extensive resection by the first Billroth method.

5. If such rather generous and conservative suggestions as to the indications are pursued, the surgeon of moderate technical ability will not find himself pressed to perform operations beyond his powers. And in the minority of cases where little benefit has accrued to the patient, the more extended operation may be performed under chosen and favoring conditions.

REFERENCES.

1. *Der Zeitschrift für Chirurgie,* April-July, 1920.
2. JARUO and VANDORSKY: *Archiv. f. Verdanungs Krankheiten,* Bd. xxvii, H. 4 u. 5.
3. BRAUN, W.: *Zeitschrift für Chirurgie,* No. 29, 1921. p. 449.
4. BRÜTT: *Beitrage z. klin. Chir.,* Bd. cxxiii, No. 2, p. 449.
5. BIER, BRAUN, and KUEMMEL: *Chirurgische Operationslehre.*
6. WILENSKY and CROHN: *American Journal of the Medical Sciences,* June, 1917.
7. KOCHER, A.: *Arch. für klin. Chir.,* Bd. lxi, No. 102.
8. EISELSBERG: *Verh. d. Deutsch. Ges. f. Chir.,* Bd. xliv.
9. DOEGE: *Archives of Surgery,* vol. iii, No. 1.
10. ROUX: *Rev. méd. de la Suisse Romande,* 1920, x, 4, 569.

31 NORTH STATE STREET.

Recognition and Treatment of Minor Ailments of the Digestive System*

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The minor digestive disturbances frequently met with can be divided into those of an acute type and those assuming a chronic character. Acute catarrh of the stomach, duodenum, gallbladder, liver, intestine, and colon represent the first group. The diagnosis is usually easy; the symptoms are pronounced and definite.

Thus, in acute gastritis there is anorexia, retching and sometimes vomiting. A feeling of fullness and tenderness to pressure over the region of the stomach are encountered. Acute duodenal catarrh manifests some sensitiveness in the right upper abdominal area and is frequently accompanied by jaundice.

In acute cholecystitis there is tenderness in the region of the liver and beneath it. The liver is usually slightly swollen, and there may be slight embarrassment in breathing deeply. Acute hepatitis will show similar symptoms, but the enlargement of the organ will be more definite and the tenderness over it more pronounced.

Acute enteritis will be accompanied by crampy sensations all over the abdomen, slight nausea, frequent diarrhea, and again tenderness to pressure in the lower abdomen.

Acute colitis reveals tenderness over the large bowel, cramps, constipation and difficult bowel movements with mucus alone and sometimes mixed with blood.

In all these affections a rise of temperature is usually present. As a rule the degree of fever corresponds to the severity of the process of disease.

Acute appendicitis (catarrhal) reveals tenderness to pressure over McBurney's point. The patient experiences pain in the right iliac region. In the severer forms there are present an exudate in the right iliac area, spasm or rigidity of the right abdominal muscles, and usually symptoms of infection (fever, nausea, vomiting and abdominal colic).

The treatment of most of these affections is comparatively simple and easy. The two principles of greatest importance are rest of the affected organ and following Nature's indicated paths, or, in other words not interfering with symptoms unless they become a danger in themselves. Many of the symptoms accompanying a disease are regulatory mechanisms serving to reestablish health. Thus, in acute indigestion, there is anorexia and sometimes vomiting. The first symptom serves to keep food away from the stomach and to establish the desired rest, the latter symptom (vomiting) to rid the afflicted organ of undesirable and abnormal material. To interfere with these wise arrangements would be wrong.

If, however, the vomiting persists over too long a period and there is danger to life from inanition, measures against it have to be undertaken. We should deal similarly with other symptoms, such as fever, diarrhea, and constipation. Do not interfere too much, but step in when a symptom, by its great severity or persistence, begins to become dangerous to life.

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The chronic minor ailments of the digestive tract are usually functional disturbances, such as hyperchlorhydria, subacidity, nervous dyspepsia, nervous regurgitation, nervous eructations, anorexia, sitophobia, and habitual constipation.

In making a diagnosis of functional disease of the digestive tract it is always essential to exclude an organic lesion as the basis of the disease. This is often easy, but at times is difficult or impossible.

With regard to the type of disease the following rules generally obtain:

1. Conditions going along for a long time with a train of symptoms not changing in character nor in gravity belong to functional disturbances.

2. Ailments showing changes in the subjective symptoms but persisting for a long period of time without materially deteriorating the objective state of the organism are generally neuroses.

3. Diseases lasting a few months, steadily progressing in severity, and generally changing the looks of the individual from a healthy to a sickly appearance, are usually of an organic type and often malignant.

4. Digestive disturbances persisting for some time, alternating with free intervals, and reappearing in a steadily severer form, with perhaps shorter intervals of euphoria and longer periods of disease, are often due to a benign organic lesion.

The functional disturbances can be discovered either by the symptoms present or by a direct examination of the function in question. Thus: In hyperchlorhydria, there are pains late after meals; in subacidity the dislike of meats. The neuroses are generally recognized by their subjective symptoms and apparent lack of an organic lesion. A great many neuroses develop after slight inflammatory processes, persisting as a result of habit; thus ructus nervosus, regurgitation, rumination, and sitophobia.

TREATMENT

Functional disturbances, as well as digestive neuroses, never endanger life, except by faulty management and insufficient nutrition.

The main treatment of functional and neurotic disturbances of digestion consists in instituting a hygienic way of living and correcting any abnormal states discoverable in distant organs, inasmuch as most of these disturbances are due to an improper way of living, such as too fast eating, too many condiments, alcohol, tobacco, too great mental strain or anxiety, physical overexertion; or the opposite status, such as too slow eating, and lack of occupation, or to reflex states from distant abnormal organs, such as eyestrain due to astigmatism, appendicitis, gallbladder lesions and uterine disorders.

The correct way of living includes also a proper amount of food, not too much, nor too little. Great deviations in either direction are occasionally the cause of existing digestive and other severe ailments.

Work without too much fatigue, with sufficient periods of rest and sleep, the ingestion of simple foods in moderate quantities, and freedom from mental strain, are the main principles in the management of these chronic sufferers.

As regards the quantity and quality of foods the patients should partake of common foods in the ordinary amounts customary at the family table and should weigh themselves once a week or so, in order to see whether they keep their balance. Very coarse and highly seasoned substances, also too many courses at one meal, should usually be avoided.

The special variety of functional disturbance may require additional points of dietary and medicinal treatments, but these are usually subordinate to the general principles outlined above.

In hyperchlorhydria frequent eating, an abundance of butter, eggs, milk, vegetables and a small amount of meat; avoidance of spices and acids are required. In the way of medication alkalies, such as sodium bicarbonatic, magnesium, kaolin, neutralon, bismuth and calcium are beneficial.

In subacidity and achylia an egg milk diet with fine cereals and mashed vegetables and soups with some spices will at first be given. Later on fish and chicken and other kinds of tender meat can be added. As a medicament hydrochloric acid can be administered for short periods of time, while stomachics, such as nux vomica, gentian, condurango, quassia and cinchona can be administered for longer periods of time.

The habit neuroses require systematic suppression of the faulty habit. Ructus or aerophagia must be combated by the patient's avoidance of belching whenever feasible, even should he feel uncomfortable. Regurgitation of the food must be suppressed by the patient, but if the food has reached his mouth, he should swallow it.

As an illustration of the importance of the right management of this condition the following case may be briefly described:

A boy of nine was brought to me complaining of vomiting for the last two years. The ailment affected him to such an extent that he lost considerably in weight, was kept back in his growth and felt weak and sickly all the time. While in my office the boy brought up a mouthful of food. His mother then said that this was the way he vomited, namely, mouthfuls at a time. A diagnosis of regurgitation could, in this way, be easily made. The loss in weight was ascribed to the failure of the food to remain in the digestive tract, which led to a state of inanition. The treatment consisted of making patient partake of a liberal diet and insisting upon him swallowing the food when it came back to his mouth. The mother was instructed to keep close watch on the boy and to see to it that this rule was strictly adhered to. He soon began to increase in weight and in a short time regained his health completely.

Rumination is mastered by the intentional suppression by the patient of the coming up of the food, and not masticating again, but simply swallowing what has reached his mouth. Any dietary régime in these cases is of no advantage and rather hurtful. Nerve sedatives are of benefit.

20 EAST SIXTY-THIRD STREET.

A New Technic for the Preparation of Bacillus Acidophilus Milk and Its Therapeutic Value

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Escherich observed in 1886, while investigating the fecal flora of infants, the predominance of great numbers of gram positive rods. He did not attach any particular importance to these organisms and it remained for Moro in 1900 to isolate and demonstrate these gram positive rods to be a distinct type of intestinal organism which he named Bacillus acidophilus. Tissier in 1900 isolated Bacillus bifidus, an organism apparently related to the acidophilus. Bacillus bifidus appears to be the dominant organism in the fecal flora of breast fed infants. As the child grows older and the artificial feeding is made to include a higher percentage of protein substances, the Bacillus bifidus is replaced by the Bacillus acidophilus. As the child approaches adolescence and the diet is made to include a higher percentage of proteins, there is a proportionate decrease of the aciduric types and the intestinal flora becomes more complex in character.

The Bacillus acidophilus is the protective organism of the intestinal tract. If a sufficient amount of a suitable pabulum is present in the digestive residue they are capable of suppressing the activity of the harmful types of intestinal bacteria. That is, they suppress the proteolytic activity of the putrefactive, the sacchrolytic activity of the fermentative and the infective activity of the pyogenic bacteria. Lactose, because of its slow assimilation, passes to the lower ileum and colon when taken in sufficient amounts and is the food upon which the acidophile types thrive best (1). Maltose and dextrine have a similar action upon the aciduric types.

Bacillus bulgaricus bears a microscopic resemblance to Bacillus acidophilus, but culturally, they differ (2). Bacillus acidophilus is an organism separate and distinct from Bacillus bulgaricus. Bacillus acidophilus is a normal inhabitant of the intestinal tract. Bacillus bulgaricus is essentially a milk parasite and cannot be acclimated to the intestinal tract. In young patients Bacillus acidophilus can be made to dominate the intestinal flora by adding lactose to the diet, thus proving its existence in the feces. Rettger and others have shown that lactose also aids the growth of Bacillus acidophilus in the intestines of experimental animals.

If the intestinal flora has a definite biological significance in relation to health and if the maintenance of this biological interrelationship is related to diet, then the study of these interrelationships must necessarily begin in early childhood, when the metabolic processes are harmonized and the diet approximates more nearly the normal than at any other time in life. During this period the intestinal flora is quite simple in character and is dominated by the aciduric types. It is at this period of life that the majority of children are free from foci of infection and naturally the metabolic processes are in the ascendancy and the whole biological unit is passing through an actively constructive phase.

The diet, during this early period, consists chiefly of vegetable substances, fruits, grains and milk. There appears to be a relationship between the aciduric flora, the lactovegetarian diet and the constructive metabolic phases of the child. However, proportionately as the diet increases to include proteins, there is a corresponding reduction, not alone of the percentage of acidophile domination, but also of the constructive metabolic rate. It would appear that, biologically, it was intended that we subsist chiefly on a lactovegetarian diet that would stimulate the proliferation of the friendly acidophile types, which in turn prevent or inhibit the putrefactive, fermentative or pyogenic types from gaining lodgement in the lower digestive tract. The lower digestive tract furnishes a vast and fertile field for the invasion of pyogenic bacteria and for harboring the putrefactive and fermentative types.

As a rule, the suppression of the acidophile types, with a domination of the putrefactive and pyogenic types, causes, first, simple putrefaction of the fecal contents, which is followed by a stasis of the colon. The integrity of the mucosa of the colon is broken and there occurs a rapid absorption of the products of putrefaction and in time, the invasion of the mucosa, lymp nodes, and the mesenteric lymph system by the pyogenic types. From these locations, bacteria and bacterial products find their way into the blood stream or are drained to the spleen and liver, resulting finally in splenic induration and biliary fibrosis (3). The stasis of the colon necessarily predicates a stasis of the entire intestinal tract and in this way the physiological function of the digestive tract is disorganized. It is to be remembered that intestinal infection is associated, in almost every instance, with infections in the upper digestive or respiratory tracts.

Chronic diseases of indefinite origin are frequently associated with an intestinal flora of the pyogenic or putrefactive type. While a complex fecal flora may be present in apparently normal and healthy individuals, it does not signify that this apparent state of health is predicated upon the complex nature of this flora, but rather that the health picture is not as sound as it appears and that the well being of the individual is being menaced consistently by this type of flora. If such cases were followed, it would be found that in time this complex flora undermines the defenses and constitutional resistiveness of the host, predisposes to other infections, and finally a frank expression of their activity is manifested by crippled functions and damaged structures of the body.

PREPARATION OF BACILLUS ACIDOPHILUS MILK.

When preparing a therapeutic substance for oral administration, it is well to consider the comfort of the patient. Bacillus acidophilus must be given in large doses to produce results. The average culture media upon which it is grown has many disadvantages, chiefly in producing nausea or hyperacidity, or excessive flatulency. The media of choice would be one pleasing to the senses of sight, smell and taste, and in addition must be one upon which the acidophilus will yield a high bacterial count.

Rettger's technic.—After much experimentation, Rettger succeeded in training the acidophilus to coagulate milk (4). Bacillus acidophilus is not a milk parasite but a normal inhabitant of the intestinal tract. Since Bacillus acidophilus is not at home in a milk medium, the first requirement is that the milk should be sterile, for if other organisms are present, their growth will exceed the development of the acidophilus and the milk will be worthless and often harmful. Fresh skimmed cows' milk, in litre quantities, requires thirty minutes autoclaving under sixteen pounds' pressure to become sterile. It is cooled and inoculated under strict laboratory technic and incubated for twenty-four hours at 99° F. A curd is formed during this process, and there is a slight separation of the curd from the whey. The preparation is then ready for use. We have noted that if the milk is not sufficiently autoclaved many coccoid forms appear associated with the bacilli and we believe these forms to be of a nature of transmutation of the bacilli. We have been able to eliminate the coccoid forms by simply growing the culture containing them on a well autoclaved milk for several successive generations and the smear will show only viable gram positive bacilli. The milk prepared by Rettger's technic is brownish in color, creamy in consistency, aromatic in odor and slightly acid in taste. We have had excellent results with milk prepared according to this method, but some patients objected to the taste, color and consistency.

A new technic.—After experimenting for some time we have been able to produce a milk that is white in color, of a nonlumpy consistency, with practically no odor and in which we can regulate the fat content to suit the requirements of the patient. The milk can also be made with an acid or slightly sweetish taste. This can be done without altering the bacterial count. We prepare the white acidophilus milk in the following way: One pint of tap water is placed in a litre flask. If one wishes a sweet tasting milk, a heaping tablespoonful of lactose is added to the water, which is then autoclaved for twenty minutes under twenty-five pounds pressure. The water is cooled and a pound tin of unsweetened, evaporated milk is added to the flask, observing sterility. The mixture is inoculated with ten c.c. of a stock culture of Bacillus acidophilus under aseptic technic, shaken and incubated for twenty-four hours at 99° F. The curd formed will be soft, white and slightly separated from the whey at the top. Shake the flask to break the curd, refrigerate, and the milk is ready for use. The acidity of the milk is controlled by the incubation period—the longer it incubates the more acid it becomes. The fat content may also be regulated by varying the amount of water or milk.

If either of these methods is followed it is possible to produce acidophilus milk in pure culture. We have experimented with boiled milk, evaporated milk and boiled water, and condensed milk and boiled water, and while a satisfactory milk may be produced for a time, there is the ever present possibility of contamination. Under our instructions patients have tried to produce the milk at home, but contamination and lack of proper incubation facilities have been active deterrents to successful results. The milk should be as uniform as possible day after day in dosage, bacterial count, consistency, odor, taste, viability and purity of culture. The success of acidophilus therapy is dependent upon the observance of a number of minute details which may appear as unnecessary or unessential to one unacquainted with intestinal bacteriology.

Drug manufacturers have sought a way to dispense Bacillus acidophilus in capsule, tablet or liquid form with doses of three to five millions of viable bacteria. The physician, unmindful of the vast amount of bacterial life operative in the intestinal tract, is led to believe that millions constitute massive dosage. That is not the case, however, for when one speaks of intestinal bacteria, one deals with trillions. It is possible to simplify the intestinal flora with minute doses of acidophilus if one prescribes six to ten ounces of milk sugar a day with these bacteria. We have tried this with success. In many instances, however, the patient objects to taking the milk sugar. Tablets and capsules are makeshifts which appeal to the patient's idea of convenience and to the credulity of those who are unmindful of the vast amount of intestinal bacterial activity. The liquid culture of the Bacillus acidophilus, used in sufficient doses and fortified with lactose, is as effective as the milk, but is not so palatable. There are some patients who refuse to or cannot take milk for various reasons. In these cases we use a lactose whey culture which is a satisfactory medium and one which gives a tremendous growth in twenty-four hours. The whey is made as follows:

PREPARATION OF WHEY FOR BACILLUS ACIDOPHILUS.

Boil the milk slowly for twenty minutes. Let it stand for thirty minutes or until a pellicle forms on the surface of the milk. Remove the pellicle and gently boil, add one gram of sodium citrate to each litre of milk. Let it stand for thirty minutes, then boil two minutes. Add slowly twenty c.c. of a twenty per cent. hydrochloric acid solution to each litre of milk. This coagulates the fats. Let stand for forty-five minutes, then remove the fats by filtering through a towel or fine gauze. Bring the fat extracted milk to a gentle boil. Neutralize with twenty per cent. sodium hydrate, titrating with litmus paper. Filter through a double layer of filter paper. After filtering dilute the pure whey three times. Take about five hundred c.c. of the diluted whey and dissolve in it ten grams of peptone, five grams of salt, ten grams of gelatine, and one hundred grams of lactose for each litre of diluted whey. Filter this whey with the nutrients into the diluted whey and autoclave in litre quantities for thirty minutes at five pounds' pressure. After the whey has entirely cooled, inoculate with a twenty-four hour culture of Bacillus acidophilus. Incubate for at least twenty-four hours.

It is highly probable that Bacillus acidophilus milk will never be a commercial success, because the preparation of the milk must follow an exacting technic to which no one will contribute assiduously unless directly interested in its administration. It is hoped that Bacillus acidophilus will escape the commercial exploitation to which Metchnikoff's bulgaricus was subjected.

Bacillus acidophilus is not a cureall. It will perform but one therapeutic function, namely, to assist in the reestablishment of the normal biological action of the intestines and colon, if certain other circumstances are favorable and make possible or assist in the performance of this one function.

The performance of the biological function of Bacillus acidophilus in the digestive tract is predicated upon (4):

First.—The removal of foci of infection from the upper digestive tract (teeth, tonsils, sinuses, gallbladder) and the respiratory tract. Of course, venereal and genitourinary infections must also be attended to. A complete *deinfection*[1] should be accomplished concomitantly, not simply the removal of one foci, an interval of waiting for results, and if none, the search for another foci and so on.

Second.—In many instances upon the efficient nonsurgical mechanical drainage of the colon. This process drains the colon, an infected area, and also renders mobile a colon partially immobilized dynamically, and, also by adhesions (3-5).

Third.—Sufficient doses of pure cultures of viable strains of Bacillus acidophilus recently isolated from a healthy intestinal tract.

Fourth.—The maintenance of Bacillus acidophilus domination by diet.

By the observance of these four factors it is possible to simplify rapidly the complex nature of the fecal flora of man in three to five days and to maintain this simplification after there has been a sufficient change of the biological processes in the intestinal tract to permit of the acidophile domination in association with the proper dietary measures (3). It is evident that the suppression of the acidophile types allows the putrefactive and pyogenic types to become entrenched in the crypts of the intestinal mucosa, and in many instances in the lymph nodes and the mesenteric lymph system, and effect a more or less permanent residence, so that their dislodgment is not necessarily accomplished by a simplification of the intestinal flora over a few days. It frequently requires months of simplification of the fecal flora to change the biochemical environment, so that it is inimical to the growth of the putrefactive and pyogenic forms, not alone in the intestinal canal, but also in the intestinal tissues.

One should not expect Bacillus acidophilus to accomplish but one thing, namely, the simplification of the intestinal flora, and this can be accomplished successfully only by a removal of foci of infection from the upper digestive and respiratory tracts, and by the adherence to a proper diet.

The part that foci of infection play in the production of disease has been so ably demonstrated by so many different investigators and by so many different technics that is useless to present any argument for it. Volumes have been written on the subject and it is an approximation of cause and effect in medicine which has taken so long to be brought about. Little attention has been given to the intestinal tract and less has been known of the favorable or unfavorable influence that the intestinal flora plays in the maintenance of good health. Clinically, intestinal infection produces, or is associated with, a multitude of disorders and diseases. The more common types of diseases associated with infections of the digestive tract are: cardiovascular renal conditions; rheumatism; arterial disease; essential high blood pressure; some forms of skin diseases; some forms of asthma; neurasthenic and psychasthenic states; neuritis; some forms of neuralgia; malnutritional states; some forms of obesity; diabetes; chronic constipation; autointoxication syndromes; subacute or chronic appendicitis; certain ocular conditions; protracted convalescent states; either from acute diseases or operations, or pregnancies; chronic cholecystitis; hemorrhoids; syndromes characteristic of visceroptosis; mucous colitis and various indefinite digestive disorders (6-3).

Bacillus acidophilus milk constitutes a means of giving enormous acidophilus doses in a palatable form. It constitutes a food product as well as a therapeutic beverage. It is given in quart quantities, daily, until the differential bacterial count of the fecal smears show a sixty-five or seventy per cent. dominance of Bacillus acidophilus, and then the dose is regulated thereafter by the percentage of domination maintained by diet. It is essentially a biological measure with many advantages and few disadvantages, and if used under proper conditions will do one thing, namely, suppress the activity of the putrefactive and pyogenic types. It is a biological intestinal antiseptic and it appears to promote not only the physiological function of the intestinal tract but also to aid materially in constitutionally benefitting the individual.

REFERENCES.

1. Rettger and Cheplin: *Transformation of the Intestinal Flora,* Yale University Press, 1921.

2. Torrey, J. C., and Rahe, A. H.: *Journal of Infectious Diseases,* 1915, 17, 437.

3. Norman, N. P., and Eggston, A. A.: New York Medical Journal, April 19, 1922.

4. Rettger and Cheplin: *Transformation of the Intestinal Flora,* Yale University Press, 1921.

5. Norman, N. P.: *American Medicine,* May, 1921.

6. Bell, George Huston: *Journal A. M. A.,* October 11, 1919.

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[1] This word is perhaps more inclusive than the word disinfection.

Radiological Diagnosis of Primary Carcinoma of the Ascending Colon with Metastasis to the Jejunum*

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Case.—A. P., female, aged fifty-two, widow, referred for radiological examination on October 19, 1921. Her father died at the age of sixty-one from cancer of the esophagus and her mother died at sixty from kidney disease. Two brothers were dead, cause unknown, and two sisters were alive and well. In childhood she had had measles and typhus fever at the age of twenty-two. Since that time the patient had suffered from colitis for six years. From the age of twenty-eight, however, up to the time of this report the patient had been in good health. Her surgical history was negative. Menstruation began at the age of fourteen, menopause at forty-eight. She was married at twenty, had had no children, but two miscarriages.

Eight weeks before this report was made the patient began to complain of pain in the right lower abdomen, and a diagnosis of appendicitis was made. The patient was treated medically and remained in bed for three days and apparently recovered from what was supposed to be an attack. Two weeks later she began to notice a swelling of the abdomen, but with no symptoms of distress or discomfort. Her appetite was good. Bowels were slightly constipated. There was no loss of weight or strength complained of. The swelling of the abdomen had been the same for the last two weeks, but prior to that time it was growing larger from its first appearance, four weeks previously.

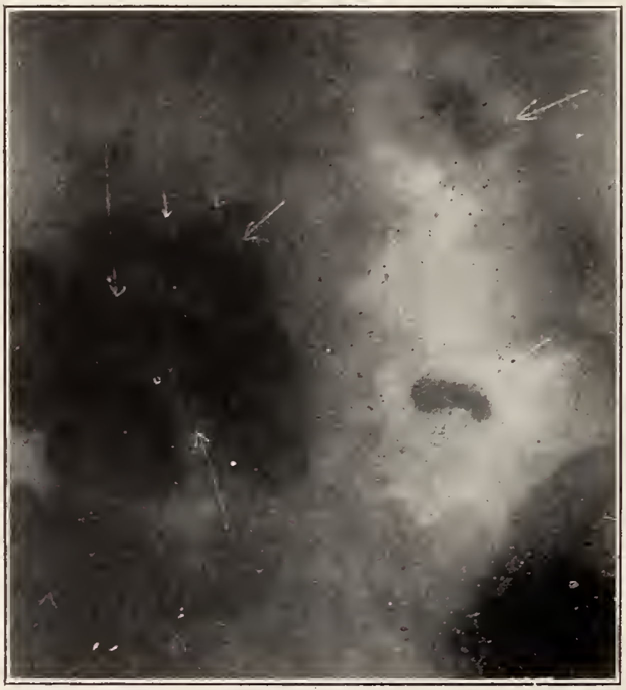

Fig. 1.—Examination after six hours showing dilatation of the jejunum with the characteristic vertical arrangement of the coils; also canalization.

Physical examination showed head, neck, chest, cardiovascular system, genitourinary organs, skin, bones and joints all negative. She was well developed and well nourished. The entire abdomen was swollen, but there was no tenderness on pressure and no rigidity. On palpation of the abdomen no abnormal masses could be felt. The fluid wave was distinctly present. The clinical diagnosis was: 1. Tuberculous peritonitis. 2. Ovarian cyst. 3. Hypertrophic cirrhosis. An examination of the blood and urine was negative.

A radiological and radioscopical examination of the gastrointestinal tract showed the stomach to be sausageshaped, and situated high in the left hypochondriac region. The shape of the stomach and the elongation of the duodenum were probably due to compression from the fluid in the peritoneal cavity. There was no evidence of defect in the greater or lesser curvatures of the stomach or of the pylorus.

An examination after six hours showed no residue in the stomach. The small intestines in the upper part of the jejunum and the ileum showed numerous areas of constriction, with tremendous dilatation of the small intestines. The lower portion of the ileum showed a marked dilatation, indicating obstruction at the ileocecal valve. There was distinct obstruction in the jejunum with the characteristic vertical arrangement of the coils of the small intestine and gas bubbles. Canalization beyond the area of obstruction was also seen.

An examination after twenty-four hours showed a distinct spasticity of the ascending colon.

An examination by barium enema showed the entire large intestine well and fairly evenly filled with the barium enema. There is, however, a slight dilatation of the colon above the area of constriction of the ascending colon. The filling defect in the ascending colon was fairly persistent and marked, and visualized after the emptying of the barium enema.

The pathological findings suggest: 1. The stomach is negative for new growth or ulcer, and is likely in a state of neurosis due to compression. 2. Obstruction of the small bowel, probably the jejunum, with multiple adhesions causing marked distention of the bowel. Dilatation of the lower portion of the ileum near the ileocecal valve, indicating obstruction in that region. 3. Filling defect of the cecum and ascending colon, which, while persistent, cannot be definitely attributed to malignant and new growth.

In my opinion the patient is suffering from a malignant new growth causing obstruction of the small intestine. The reason for not developing symptoms of obstruction, with characteristic clinical manifestations of the same, is due to the fact that in spite of the obstruction and distention of the small bowel, there is canalization formed through which the contents of the small intestines empty themselves. The patient was admitted to the St. Marks Hospital on October 21, 1921, and was operated upon the next day. The operation was performed by Dr. Benjamin T. Tilton.

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*Read before the Yorkville Medical Society, New York City, January 16, 1922.

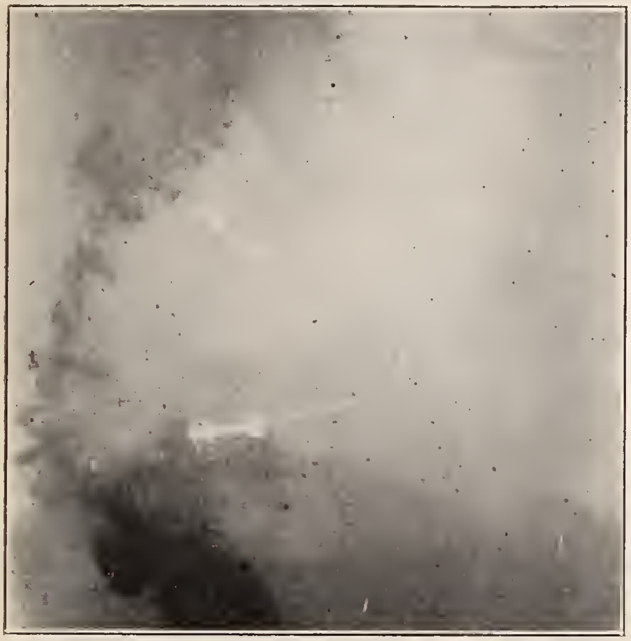

FIG. 2.—Examination after twenty-four hours showing distinct spasticity of the ascending colon and defect.

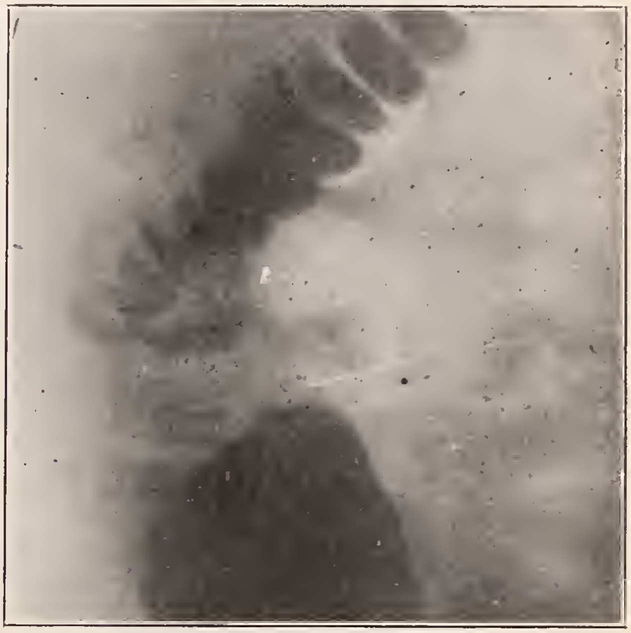

FIG. 3.—Barium enema; same persistent defect after evacuation of the bowels.

Operation.—A median line incision below the umbilicus was made. About five quarts of clear straw colored fluid was found free in the peritoneal cavity. The omentum was covered with hard gray colored masses varying in size. The ascending colon had a large mass about three inches above the ileocecal valve. The lower end of the jejunum was infiltrated with a similar mass causing almost complete obstruction. The liver was covered with a new growth of similar character. A section of the omentum was removed for pathological study.

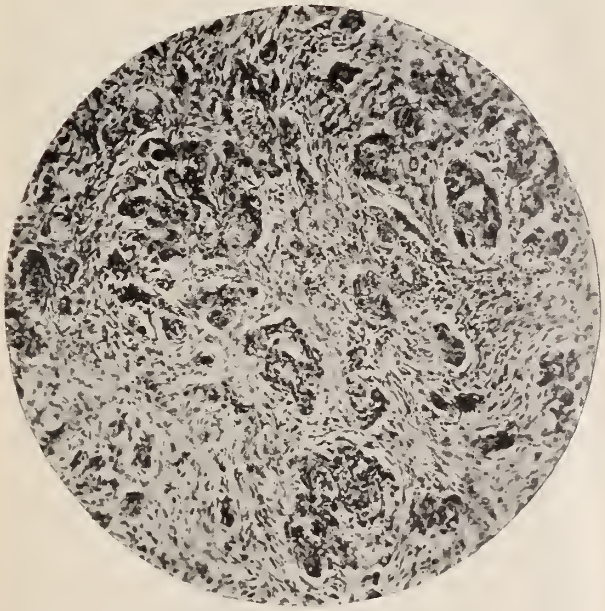

FIG. 4.—Section from one of the metastatic glands of the omentum showing adenocarcinoma.

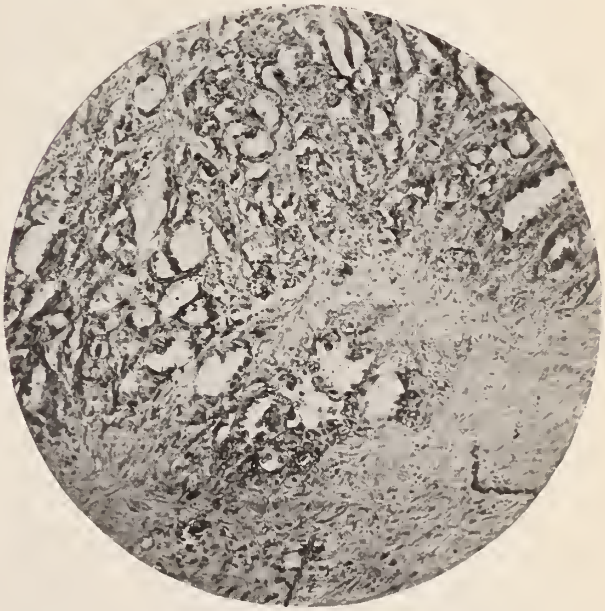

FIG. 5.—Section from one of the metastatic glands of the omentum showing adenocarcinoma.

The postoperative surgical diagnosis was malignant neoplasm in the ascending colon with metastasis to the jejunum, omentum and liver. The pathological report was hyperplasia of alveoli filled with irregular, cylindrical epithelial cells—adenocarcinoma. On the seventh day after the operation, November 1, 1921, the patient was up and about, her appetite was good, and her general condition was much improved. On November 3, 1921, the patient was discharged.

In submitting the radiological report to the surgeon the radiologist considered the history, as well as the clinical findings in this case. In spite of the absence of typical signs and symptoms of malignancy, such as ulceration and pus discharge from the rectum, hemorrhage, cachexia and signs of intestinal obstruction, the radiologist was still obliged to adhere to the clinical opinion of malignancy. Later the radiological findings corroborated the clinical findings. It is difficult to ascertain by radiography malignancy of the large or small intestine, unless a definite palpable mass is found in the abdomen, or signs of obstruction appear. Then the case becomes a classical one of malignancy, with all the typical signs.

Carman, of the Mayo Clinic, in *Röntgen Diagnosis of Diseases of the Alimentary Canal,* says: "Practically the sole abnormality of the jejunum and upper ileum showing definite röntgenological signs is obstruction. When the obstruction is pronounced the signs are quite decisive. New growths, more commonly carcinomas and adhesions from inflammatory processes, are the usual cause of stenosis. Unless a tumor mass can be palpated the nature of the obstructing lesion can hardly be predicted, nor can its exact seat usually be determined."

In this case as well as in many others, it is evident that the radiologist should be a good clinician primarily and somewhat of a pathologist. He should be given the privilege of taking a careful history and making a physical examination of the patient referred to him for radiological diagnosis, and as far as it is practicable the radiologist should be given the opportunity to follow his cases in the same manner as the surgeon and the internist, so that he may develop into a better diagnostician. The day is near when the radiologist will cease to be a mere "picture man," and will demand a place at the consultation table with his colleagues.

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Chronic Colitis in Neuropsychiatric Cases*

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In the plan of treatment for disabled ex-service men, several hospitals were set aside for observation and treatment of persons whose chief disability was a psychoneurotic one. The first of such hospitals to be opened was the institution known as United States Public Service Hospital No. 37, which is located at Waukesha, Wis. Patients are sent here only upon recommendation of neuropsychiatrists after careful examination or after a period of observation in another hospital. Most of the patients have been examined many times prior to admission.

The purpose of this paper is primarily to emphasize the importance of chronic colitis in this hospital. A statistical review from a diagnostic viewpoint of a series of consecutive admissions may be of interest to demonstrate its relative frequency and also to give a general idea of the type of cases treated.

The series under consideration consists of 156 consecutive admissions to my service, between the dates of June 1, 1920, and June 1, 1921. Table I gives a classification of the 156 admissions according to diagnosis. The final diagnosis was made only after a long period of observation, and was concurred in by the entire staff of the hospital before whom the patient was presented for review prior to discharge. In a few cases the diagnosis has not as yet been finally confirmed, because the patients are not yet ready for discharge or for other reasons. The diagnosis given is that of the most outstanding condition from the viewpoint of industrial and social efficiency. Many cases did not present the picture of a single neuropsychiatric condition, but were borderline cases with admixtures of two or more conditions. In a large number of cases there were certain organic factors which as a rule were not in themselves disabling except as they increased the psychoneurotic reactions.

In studying the diagnosis in Table I, two points stand out prominently; first, that in only fifty-four per cent. of the admissions can the final diagnosis be classed among the psychoneuroses; secondly, that twenty-six per cent. of the cases are purely organic.

Chronic colitis is important because it is of frequent occurrence, and especially because it is often entirely overlooked. In this series there are twenty-two cases of chronic colitis. In six of them the colitis was the most prominent condition, and in four others it was an aggravating factor of greater or lesser significance to other organic conditions. In only twelve cases was the primary diagnosis a psychoneurosis. Of these, seven were diagnosed neurasthenia, three hysteria, one anxiety neurosis, and one psychasthenia. A statistical study of this group of cases with the results of treatment is set forth in Table II.

In the foregoing twenty-two cases, five had no neurotic or psychoneurotic symptoms. Of the remaining seventeen the psychiatric condition was slightly improved in four, greatly improved in twelve, and arrested in one as a result of treatment.

The important symptoms of chronic colitis may be placed in two main groups. First, those symptoms referable to the chronically inflamed colon itself, such as dyspepsia, abdominal distention, tenderness, abdominal pain, intestinal cramps, diarrhea, and passage of mucus; secondly, those symptoms due to toxicity, such as headache, vague muscular and neuritic pains, backache, fatigability, fainting spells and weakness. One is less likely to err in the diagnosis if the symptoms in the first group are stressed by the patient. Frequently, however, they are not, while those in the second group are emphasized.

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*Approved for publication by the Surgeon General of the United States Health Service.

TABLE I—CLASSIFICATION BY DIAGNOSIS.

Psychoneuroses		
Hysteria	47	
Neurasthenia	26	
Anxiety neurosis	9	
Psychasthenia	2	
Total	84	54 per cent.
Borderline Conditions		
Constitutional psychopathic inferiority	8	
Constitutional psychopathic state	1	
Hypochondriasis	1	
Cyclothymia	2	
Total	14	9 per cent.
Psychoses		
Dementia præcox	5	
Manic depressive psychosis	2	
General paresis	2	
Total	9	6 per cent.
Organic neurological conditions		
Epidemic encephalitis	3	
Epilepsy (idiopathic)	2	
Epilepsy (traumatic)	2	
Brain injury with hemianopsia	1	
Organic brain disease	1	
Cerebrospinal syphilis	1	
Cerebellar tumor	1	
Total	11	7 per cent.
Other organic conditions		
Hyperthyroidism	8	
Chronic colitis	6	
Chronic nephritis	5	
Chronic pulmonary tuberculosis	5	
Organic heart disease	4	
Diabetes	1	
Chronic arthritis	1	
Total	30	19 per cent.
Miscellaneous		
Mental deficiency	4	
Neurocirculatory asthenia	3	
Chronic alcoholism	1	
Total	8	5 per cent.
Grand total	156	100 per cent.

TABLE II—RESULT OF TREATMENT OF COLITIS

Diagnosis	*No. of cases*	*Un-improved*	*Slightly improved*	*Greatly improved*	*Arrested*
Chronic colitis with no or minor neurotic symptoms	6	0	1	5	0
Primary psychoneurosis witb chronic colitis as an aggravating factor	12	0	2	3	8
Hyperthyroidism witb chronic colitis as an aggravating factor	3	0	0	0	3
Pulmonary tuberculosis with chronic colitis as an aggravating factor	1	0	0	0	1
Total	22	0	3	8	12

Chronic colitis cases are often considered psychoneurotic for the following reasons. First, for some unaccountable reason, the average physician knows much more about gastric ulcer, cardiospasm, or pancreatitis than he does about chronic colitis, yet the latter is vastly more important from the point of view of frequency and morbidity. We find none of the former conditions in our series while we find twenty-two of the latter. Secondly, the diagnosis is often mistaken because many of the symptoms are vague and do not point at once to their origin. Thirdly, the patient often does not realize that there is anything wrong with his intestinal tract, and so does not call the physician's attention to it.

If a physician, and especially a neuropsychiatrist, cannot quickly find a probable organic cause for these rather vague symptoms, he is likely to call the condition a gastric or intestinal neurosis, or simply neurasthenia. Often he lets the patient go on his way with some platitudes, begging for a diagnosis. Too often he tells him that his trouble is in his head, which only adds to his worry and helps to precipitate a neurosis. These patients make the rounds of doctors, being diagnosed and treated differently by each, but with no improvement, until they have lost faith in all physicians and, which is more important, in themselves. Being really sick and finding no relief, they become a prey to patent medicines, chiropractors, and other charlatans. These also failing, they become hypochondriac, irritable and moody. So it not infrequently happens that a patient who perhaps originally had only this organic condition, acquires also a neurosis or a psychoneurosis. This makes the diagnosis still more difficult, for then the physician is even more likely to overlook the organic condition when the functional is so prominent. It is no wonder chronic colitis cases are notorious for their neurotic and psychoneurotic manifestations.

Following the most markedly neurotic cases through, has demonstrated over and over again that what they needed most was to be properly understood and correctly diagnosed. When this was done, their intestinal condition explained to them, and their cooperation gained, in dietary treatment, immediately a marked improvement occurred in their nervous symptoms. This improvement has usually continued as the colitis symptoms have been relieved until the patient regains his normal mental level. Occasionally, however, if the colitis is of long standing, there is likely to be a recurrence. This is well illustrated in the following case.

CASE I.—C. C. M., ex-sergeant, aged thirty-five, complained of being "nervous, shaky and jumpy" at times. He also complained of headaches, dizziness, dyspepsia, heartburn, vomiting, occasional constipation, insomnia, restlessness, fainting spells, and emotional depression with crying spells. He said there was a band of soreness about his body at the level of the costal margin. He had been treated in many hospitals for about two years wrongly diagnosed. Upon examination marked tenderness was found over the whole course of the colon, which could be distinctly palpated and was spastically contracted. His stools were small, hard, and coated with mucus, and defecation was accompanied by cramping and tenesmus. Following laxatives he would have several watery movements with large amounts of mucus. He gave a history of similar complaints at various times for the last fifteen years. His condition was much aggravated by the army diet, but especially by the army compound cathartic pills which were frequently prescribed for him. Rational dietotherapy and physiotherapy led to considerable improvement in his intestinal and toxic symptoms. The grave psychoneurosis which had developed, chiefly because his organic condition had never been understood and properly dealt with, was only partly relieved. He left the hospital at his own urgent request to return to his home in Montana with a diagnosis of "neurasthenia with hysterical admixtures and with organic factors. The principal organic factor is a long standing chronic colitis."

Some months later he wrote that his bowel condition had again become serious, so that our work with this case was largely a failure. If the first physicians he consulted had been fortunate enough to detect and properly treat his colitis, it is certain that his psychoneurosis would never have reached the stage it has.

The second case illustrates well the importance of the toxic symptoms, and also the frequency of mistaking the colitis for appendicitis and cholecystitis. Probably most cases diagnosed appendicitis where a normal appendix is found on operation, are cases of either acute or chronic colitis.

CASE II.—F. J. G. admitted complaining of severe, persistent pains in ankles and in calves of legs, and to a lesser extent in thighs, shoulders and back. He also complained that he tired easily and was nervous and irritable. This condition had been present for two years. He gave a history of appendectomy and cholecystectomy within the last six months, and the extraction of several teeth. Before admission he had been examined by several internists and neurologists with the diagnosis of neurasthenia. Examinations by orthopedists were negative. Upon abdominal examination, persistent tenderness over the colon was found, but only after careful questioning was a history of alternating constipation and diarrhea obtained. During diarrheic attacks, there were intestinal cramping, increased abdominal pain and tenderness, and marked accentuation of his toxic symptoms. Dietetic treatment resulted in marked improvement of both local and toxic symptoms, and the patient was discharged to take up vocational training with a staff diagnosis of "chronic colitis with secondary neurotic and neuritic manifestations." Letters from this patient state that he still has some pain in his legs occasionally, but his vocational training is progressing well.

SUMMARY.

1. Of 156 consecutive admissions to the service of the writer in the first Public Health Service Hospital for Psychoneurotics, a primary diagnosis of psychoneurosis was made in only fifty-four per cent. of the cases.

2. In this series the primary diagnosis of an organic condition was made in twenty-six per cent. of the cases.

3. Chronic colitis was found as the chief disabling condition in six cases, and as an organic factor of greater or less importance in sixteen other cases.

4. Chronic colitis is very often overlooked by physicians and neuropsychiatrists with dire results for the welfare of the patients.

Grateful acknowledgment is made to Dr. Lawrence Kolb, medical officer in charge, for his constant encouragement, and to Dr. Thomas J. Heldt, clinical director, for suggestions.

The Importance of Röntgen Ray Localization of the Intestinal Tube

By JACOB BUCKSTEIN, M.D.,
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For purposes of determining the presence of the intestinal tube beyond the stomach, in the duodenum or the jejunum, the method ordinarily most relied upon is the aspiration of duodenal or intestinal fluid. This method can be accepted as proof in the large majority of cases, but it is far from being infallible and cannot be accepted as a sure criterion.

Not only may a regurgitation of duodenal fluid occur into the stomach, but in addition the end of the tube, although still in the stomach, may be sufficiently near the pyloric sphincter that by means of the syringe sufficient suction may be produced to deliver fluid from the duodenum. This possibility is indicated in Fig. 1. In this case, although duodenal fluid was obtained, a röntgenogram of the rubber tube demonstrated that the end had not advanced into the duodenum.

Where exact localization of the end of the rubber tube is important, a röntgenogram is essential. Such localization is impossible from a determination of the length of tubing swallowed. The tube may be coiled in some part of its course (Fig. 2). Moreover, owing to the variations in the size of the esophagus, stomach and duodenum in different individuals, there is a corresponding variation in the length of tubing necessary to reach any definite part of the intestine. Thus Figs. 3 and 4 are röntgenograms of the tube swallowed for a distance of thirty-four inches from the teeth, in two different individuals of approximately the same height. Although the length of tubing is identical, there is a marked variation in the location of the end. Where medication is to be injected through the tube, in order to reach the duodenum or jejunum, it would be impossible entered the intestine, without röntgen ray localization.

In the case of partial or complete obstruction to the flow of fluid through the tube, a röntgenogram therefore to determine exactly where this medication may indicate the cause. If a coiling or kinking of the tube is demonstrated, complete removal of the tube may be unnecessary. By carefully removing a small amount of tubing, the kinking or coiling may be undone, thereby permitting the fluid again to flow freely without the necessity of repassing the tube. On the other hand, the röntgenogram may show that the cause of the obstruction cannot be altered, and that removal of the tube is essential. Thus, Fig. 5 indicates the presence of a knot in the course of the tube. This was verified on removal of the tube.

When it is desired to study the nature of the intestinal fluid at varying levels for purposes of comparative study, accurate röntgen ray localization is essential. To judge by the length of tubing swallowed may lead to error, as the tube may be coiled on itself in some part of its course.

In introducing food, knowledge of the exact location of the tube is of value. The end of the tube should be in the upper part of the jejunum, just beyond the duodenojejunal junction, for the following reasons:

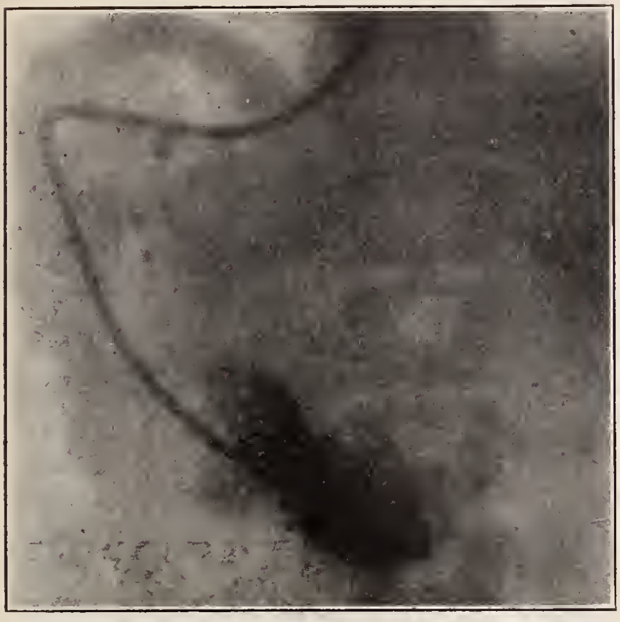

FIG. 1.—Röntgenogram indicating that the end of the tube is not present in the duodenum, but definitely ascertained duodenal fluid was obtained in this case.

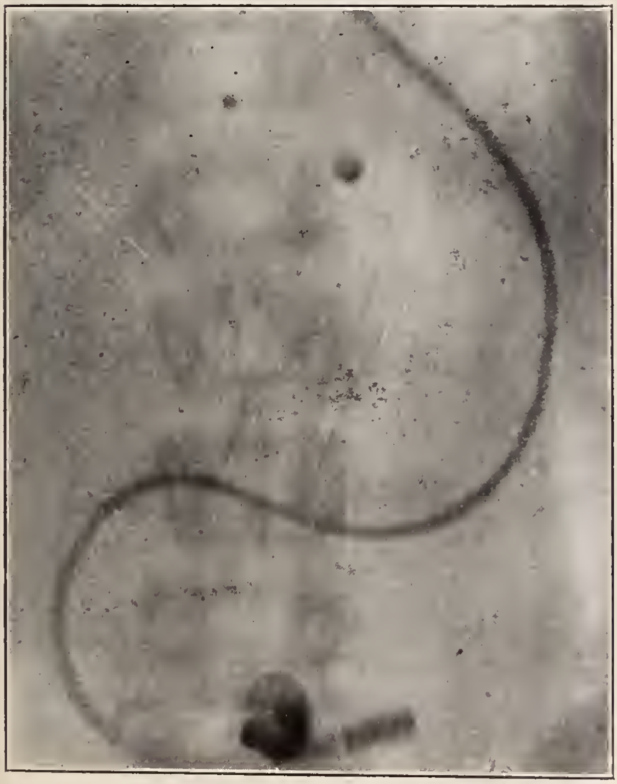

FIG. 3.—Röntgenogram showing the tube swallowed for a distance of thirty-four inches, and it is still within the duodenum. Compare with Fig. 4.

1. The possibility of the regurgitation of food back to the beginning of the duodenum, and perhaps into the stomach, is thereby reduced to a minimum, particularly when the food is introduced slowly by the drop method.

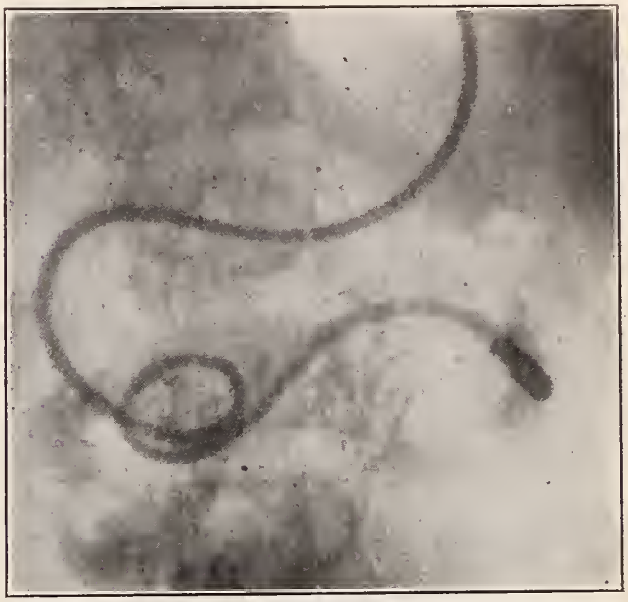

FIG. 2.—Röntgenogram of tube, indicating that coiling may occur in some part of its course.

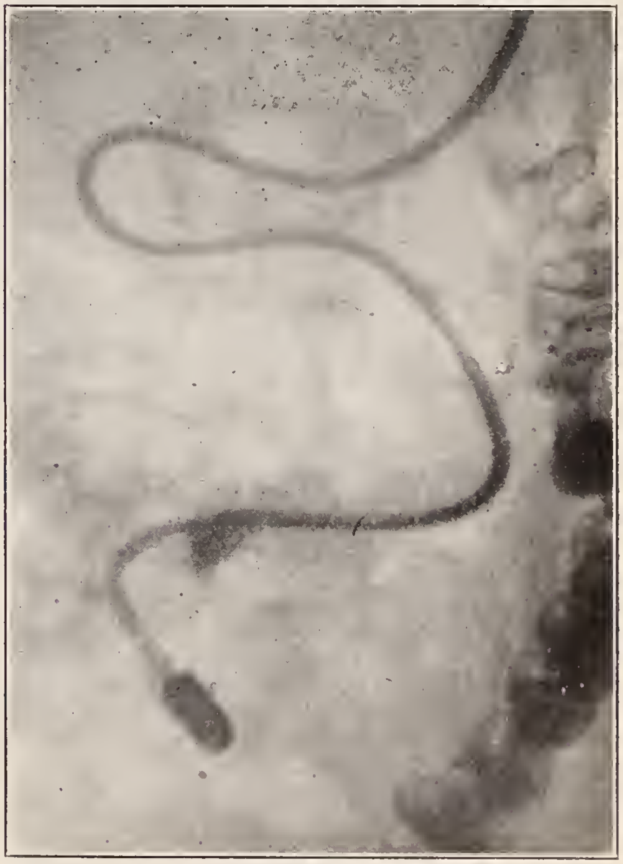

FIG. 4.—Röntgenogram showing the tube swallowed a distance of thirty-four inches from the teeth. This patient is approximately the same height as the one in Fig. 3, but there is a marked difference in the location of the end of the tube, in this case, the end being well advanced into the jejunum.

2. If the end of the tube is not advanced sufficiently far, changes in position by the patient may displace the tube back into the stomach. Such an occurrence, by necessitating the repassing of the tube, may prove time consuming and discouraging to the patient.

3. In case of vomiting, a tube inserted just within the duodenum may be vomited, whereas a tube if hooked around the duodenojejunal junction may resist expulsion.

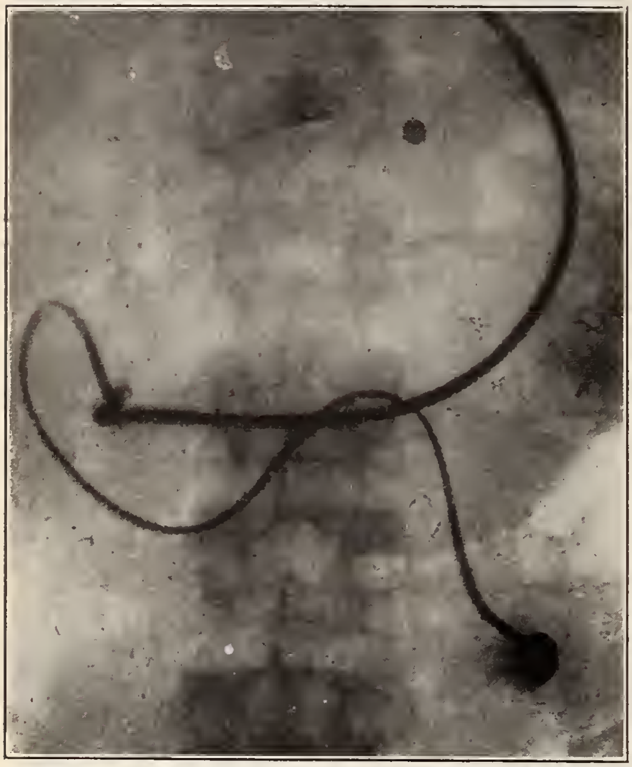

Fig. 5.—Röntgenogram of tube indicating cause of obstruction. In this case, the tube became knotted.

However, the end of the tube should not be advanced too far within the jejunum. It is probable that the digestion and absorption of food takes place less efficiently the further away from the source of pancreatic secretion the food is introduced.

I have made the following observation. In one case I introduced the rubber tube for a distance of thirty-four inches from the teeth. This brought the tube to the end of the duodenum. The metal bulb at the end of the tube had been sewed on with chromic catgut (Van Horn). Röntgenograms were taken to determine how soon the bulb would detach. It became detached within thirty-six hours. A few days later, another tube was passed in the same patient, this time for a distance of forty-eight inches from the teeth. A similar bulb had been sewed on in the same manner with a piece of catgut from the same strand. This time, however, the detachment of the bulb was not observed until seventy-two hours after the tube had been swallowed. The delay in the digestion of the catgut in the second case was probably due to the further distance of the catgut from the source of the pancreatic secretion.

Hence, in introducing food through an intestinal tube, if this be introduced at too great a distance from the ampulla, the food may fail to mix with the pancreatic and biliary secretions with sufficient intimacy to obtain the maximum degree of utilization.

Thus, though it is best to introduce the end of the tube just beyond the duodenum into the beginning of the jejunum, to minimize regurgitation of food and displacement of the tube back into the stomach, it is probably a disadvantage to introduce the end unnecessarily far within the jejunum. Accurate determination of where the end of the tube is can be accomplished only by means of the x ray (Fig. 6).

SUMMARY.

1. Various methods recommended for determining the location of the intestinal tube beyond the stomach are, with the exception of the x ray, at best highly suggestive, and may be misleading.

2. Even the aspiration of duodenal fluid, while acceptable as a rule, may occasionally prove unreliable.

3. The x ray is essential for accurate determination of the exact area from which intestinal fluid for study has been obtained, and also for the exact point of entry of medication and of food.

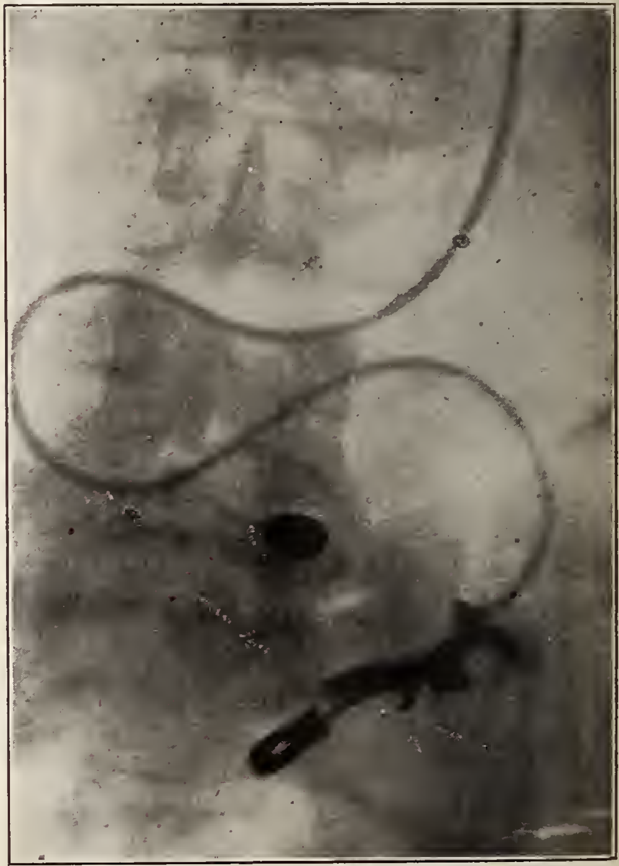

Fig. 6.—This picture indicates the tube hooked around the duodenojejunal junction in order to anchor the tube and prevent displacement or regurgitation of material when the tube is used for feeding.

4. The x ray will often help to determine the cause of obstruction in the course of the tube.

1 West Eighty-fifth Street.

A Comparison of Successive Aspirates of the Gastric Contents

*Its Interpretation Applied to the Method of Fractional Analysis**

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and HARRY J. JACOBSON, M.D.,
Detroit.

The method of fractional gastric analysis has been extensively adopted and according to the literature (1) almost universally accepted as giving an accurate picture of the stomach work throughout all its phases. Doubt is, however, thrown on its value by Gorham (2), who assumes that for the method to be correct, each specimen withdrawn must represent the stomach contents as a whole at that particular time. Wheelon (3) also makes the same assumption and both show that the stomach contents are not a homogeneous mixture. This is shown by aspirating the whole of the contents in portions of five to ten c. c. in quick succession and finding a variation in the acid content of the different aspirates.

Before proceeding with physiological investigations, it was decided to satisfy ourselves as to the value of the fractional method of analysis, to determine how closely the acidity of a five to twenty c. c. sample aspirated through the small tube approximated other samples aspirated at the same time, and to consider the interpretation of any variations which might occur.

Procedure.—In each observation the small Rehfuss or our own tube (4) was swallowed without water and the contents withdrawn in five to twenty c. c. portions in rapid succession. Note was made on each specimen of 1, the amount; 2, the percentage of solids after standing one hour; 3, presence of mucus; 4, bile; 5, free hydrochloric acid, and 6, total acidity.

These experiments were carried out on a series of fasting contents, a series after the Ewald breakfast, and on a series of patients who were undergoing the Sippy treatment of ulcer.

To ascertain the variation in acidity, the lowest figure for any one portion was subtracted from the highest of any one portion extracted at the same time. The differences in each case were added together and divided by the number of cases to get the average variation.

FASTING CONTENTS.

These were examined in fifteen patients of whom nine showed no gastric symptoms, three cases were diagnosed duodenal ulcer, one prepyloric ulcer, one gastric carcinoma, and one achylia gastrica.

There was a marked variation in the amount of swallowed mucus. One case (ulcer) showed the presence of olive oil (taken twenty-four hours previously) in about equal amounts in each of five ten c. c. portions. Three showed bile in all portions.

The average variation of total acidity was eleven degrees, with a minimum of seven degrees and a maximum of eighteen degrees. One case showed no free hydrochloric acid in any portion. Of the cases showing free hydrochloric acid the average variation was nine degrees with a minimum of five degrees and a maximum of thirteen degrees.

CONTENTS AFTER EWALD MEAL.

Forty-five observations were made. Five subjects were apparently well; fifteen suffered from extraabdominal conditions, such as incipient pulmonary tuberculosis, sacroiliac disease, and heart disease; fourteen were classified as extragastric abdominal cases, such as chronic constipation, chronic appendicitis, and cholecystitis; eleven were actual gastric cases, five being diagnosed duodenal ulcer, two gastric ulcer, two gastric carcinoma and two achylia gastrica.

Bile was present in all portions in three cases and in only one or two portions in four cases. The solid content showed much variation, the minimal variation being about five per cent. and the maximal eighty per cent.

Variation in free hydrochloric acid.—Six showed no free hydrochloric acid in any portion; twelve showed less than five degrees variation; twelve showed between five degrees and ten degrees variation; nine showed between ten degrees and fifteen degrees variation, and six showed over fifteen degrees variation. The average variation was eight and three tenths degrees.

Variation in total acidity.—Twenty-one showed less than ten degrees variation; twelve showed between ten degrees and twenty degrees variation, and twelve showed over twenty degrees variation. The average variation was twelve and two tenths degrees.

In respect of the comparative variation between normal stomachs, those showing actual disease, and those in which there was extragastric abdominal disease, we might state that the greatest variations were seen in those cases with ulcer or gallbladder disease, yet this was so inconstant that actual figures show about the same average. Fig. 1 shows the minimal variation and Fig. 2 the maximal variation encountered, while Fig. 3 shows the average for the forty-five cases.

CONTENTS ASPIRATED IN ULCER CASES.

The stomach contents in this series were aspirated in ulcer cases while the patients were taking four ounces of cream every two hours, with alkali one hour between feedings. There were twelve observations in three cases, all showing some degree of pyloric obstruction. Bile was present in all portions on three occasions. Six showed no free hydrochloric acid in any portion (shortly after alkali) with an average variation of total acidity of twenty degrees. Six showed free hydrochloric acid present with an average variation of forty degrees, while the total acidity showed an average variation of thirty-five degrees.

One observation was particularly enlightening and is shown in Fig. 4. Here the tube tip evidently fell to a part of the stomach in which the material showed free hydrochloric acid for five twenty c. c. portions and was then replaced by material containing calcium carbonate and sodium bicarbonate, yet unmixed and unneutralized.

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*Presented before the Detroit Society of Internal Medicine, December 27, 1921.

It has been shown that the stomach contents are generally not a homogeneous mixture, indeed a consideration of the physiology of the stomach (5) shows one that the fundic portion of the stomach alone acts as a reservoir for retaining the bulk of the food and normally remains in tone, slowly pushing its contents into the pars media and antrum where the peristaltic movements mix and liquefy and at intervals eject the chyme through the pylorus into the duodenum. It is also true that the acid secreting cells are present to some extent in the fundus but chiefly in the pars media and none in the antrum (6). Duodenal regurgitation is not an uncommon finding. Rehfuss (7) and his coworkers found bile in a large proportion and trypsin almost constantly in the stomach contents.

It has rightly been considered (8) that the gastric contents are a mixture of salivary, gastric, pancreatic and biliary secretions, and that any tests based on stomach chemistry are subject to great variation.

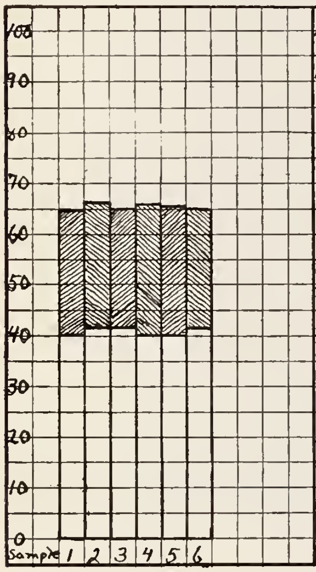

Fig. 1.

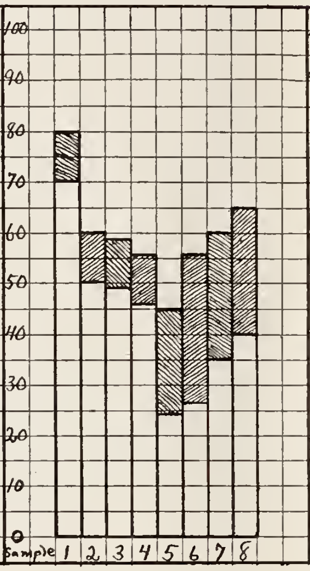

Fig. 2.

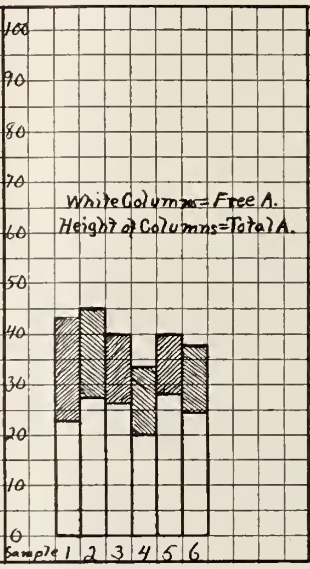

Fig. 3.

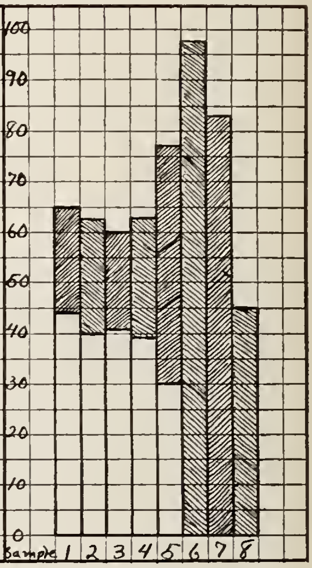

Fig. 4.

Fig. 1.—Represents case showing the minimal variation. Aspirated in six 10 c.c. portions in rapid succession at one hour after Ewald meal. Shows variation of two degrees in both free and total acid. White columns show free acid; height of columns, total acid.

Fig. 2.—Represents case with the maximal variation encountered. Aspirated in eight 10 c.c. portions in rapid succession at one hour after Ewald meal. It shows a variation of forty-six degrees in free acid and thirty-five degrees in total acid. White columns, free acid; height of columns, total acid.

Fig. 3.—Shows case with the average variation of acidity out of forty-five observations. Aspirated in six 10 c.c. portions at one hour after Ewald meal. Average variation of free acid was eighty-three degrees and of total acid was 12.2 degrees. White columns, free acid; height of columns, total acid.

Fig. 4.—From a case of prepyloric ulcer with pylorospasm. Aspirated in eight 20 c.c. portions in rapid succession while on ulcer management. Had taken four ounces of cream two hours and one dram of alkali one hour previous to aspiration. White columns, free acid; height of columns, total acid.

Obviously the acidity of any one portion extracted through the small tube depends on the location of the tip of the tube and gives the character of the contents of that part at the time. Just as obvious is the assumption that if the tube stays in the same place one could, by extraction at definite intervals, obtain the cycle of events through a long period. This we believe is what happens and the reason one gets such beautiful curves in the majority of instances. Any marked sudden deviation of the curve can be explained by a change of position of the tip of the tube, or by duodenal regurgitation. The chief cycle of stomach chemistry takes place in the pars media and pars pylorica which are the lowest parts of the organ. If the tube tip is of sufficient weight to sink in the stomach contents and if the patient stays in a sitting position, or if reclining remains supine, these conditions are in the majority of cases fulfilled and a steady curve is obtained. Repeated x ray observations have convinced us that the tube tip, due to gravity and peristalsis generally rests near the outlet of the stomach, therefore the fractional method with proper technic represents the cycle at that most important portion of the stomach allowing one to observe the acidity, presence ot pathological products, duodenal regurgitation and the presence or absence of food (emptying time). We believe it is the best method of investigating the stomach work at our command, yet like most other methods of physiological investigation, has certain drawbacks requiring proper interpretation. Its value as a diagnostic procedure in clinical medicine cannot be here discussed. Suffice it to say that Rehfuss states that there is no curve diagnostic of any disease, and that acid determination is the least of its values.

CONCLUSIONS.

1. Different portions of the stomach contents aspirated in quick succession, through a small tube, show a moderate variation in physical character and acid contents.

2. The tube tip usually rests near the outlet of the stomach if the subject remain seated or supine.

3. When small amounts are aspirated at regular

intervals one gets the cycle of events as they occur in the pars media and pars pylorica, the mechanically and chemically active portions of the stomach.

4. In our discussion we have attempted to show that fractional gastric analysis does in the majority of cases give us fairly accurate information on the normal or pathological physiology of the most important functions, and is our best method of determining food and drug action on the stomach.

REFERENCES.

1. Rehfuss: *American Journal of the Medical Sciences*, 1914, p. 857; *Journal A. M. A.*, 1918, p. 1534. Rehfuss and Hawk: *Journal A. M. A.*, February 5 and 26, 1921. Lerman, Rehfuss, and Hawk, *Ibid*, May 14, 1921. Best: *American Journal of the Medical Sciences*, December, 1920; *Journal A. M. A.*, vol. lxvii, p. 1083. Talbot: *Ibid*, vol. lxvi, p. 1849. Crohn and Reiss: *American Journal of the Medical Sciences*, December, 1917. Friedenwald and Morgan: *Southern Medical Journal*, September, 1921. Lyon, Bartle, and Ellison: N. Y. Med. Jour., Sept., 1921.
2. Gorham: *Arch. of Int. Med.*, vol. xxvii, No. 4.
3. Wheelon: *Ibid*, vol. xxviii, No. 5.
4. Lockwood: *Jour. Mich. State Med. Soc.*, Nov., 1921.
5. Cannon: *Mechanical Factors of Digestion*, London.
6. Radasch: *Internat. Jour. of Gastroent.*, vol. i, No. 1.
7. Rehfuss: *Amer. Jour. of Phys.*, 39, p 825.
8. Hardt: *Ibid*, vol. xl, p. 314.

Standardization of the Test Meal

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A patient presenting a certain train of symptoms and showing certain physical signs, and yielding certain laboratory data, is said to have a definite disease; let us say that it is lobar pneumonia. Should a similar case present itself to a physician whose skill is equal to that of the first physician, he, too, would call it lobar pneumonia. Should either or both of these cases be of unusual interest for any reason, and therefore published in our journals, physicians universally would understand and appreciate the report and profit by it. It is because of this universal understanding and acceptance of terms that men working at distances can intelligently discuss cases. It is largely by standardization of terms that we learn and progress. No one will deny the forward step made by the BNA classification of anatomical structures, whereby we now understand each and every part of the human body by one name, and not by a few.

As it has been with symptoms and diseases, so should it be with clinical laboratory tests. That it is so with most of our laboratory procedures will not be denied. An investigator in one part of the country who does a gram stain on a smear and makes his report is reasonably sure, allowing, of course, for the personal equation that a colleague many miles away will use the same technic and materials in carrying out his gram stain, and make the same report on the same smear. And it is the same in cultivating bacilli from a throat culture, or in doing a red or white blood count. Certain standards must be set and these standards must be adhered to if we are to obtain comparable results and profit and learn by them. Individual endeavor is laudable if the results obtained can be applied universally, but if only the individual concerned can understand his results then his labors do not add much, if anything at all, to the common knowledge. It is inconceivable that not all of us are agreed that standardization of technic and absolute accuracy in laboratory work is paramount to progress in this field. Halfhearted methods mean unreliable results, and unreliable results are worthless. Absolute accuracy and precision is what we want. The one outstanding procedure, and one which in many instances is performed in "an-accurate-enough-for-ordinary-purposes" attitude is gastric analysis.

I daresay it is the opinion of a large number of medical men that gastric analysis is of only slight significance, that but little reliance is to be placed on it. Why? Can there be any more direct way of finding out what an organ is doing than by going right into it and examining it. If a patient presents himself with a sore finger, our first thought is an examination of the injured member. Then why not, if a patient presents himself with evident gastric symptoms examine his stomach? Surely the giving of a test meal and the examination thereof is a simple procedure, and not over timeconsuming. Then agreed that a test meal would be instructive, what are we going to feed our patients. And it is here that a wide variety of opinions is encountered, and it is here that standardization is so wanting. To determine the exact status of the procedures employed, the following questionnaire was submitted to hospitals in various parts of the country:

QUESTIONS ASKED.

1. How is the patient prepared for an Ewald test meal, that is, for what period of time does he starve?
2. Of what does the meal consist?
3. How much of each component of the meal is the patient fed?
4. Is this amount accurately weighed and measured?
5. Is the fasting stomach aspirated prior to the feeding of the patient?
6. Is the fractional method of examination employed; if so, what is the interval between aspirations?
7. If not fractional, how long do you wait before aspirating?
8. Do you aspirate the entire amount, or merely enough for a quantitative examination?
9. If you aspirate the entire amount, do you place any significance upon the amount recovered?
10. As compared with other laboratory tests, how often is gastric analysis employed in cases, seemingly with some abdominal pathology?

Name of Hospital	*Period of Fasting*	*Components of Test Meal*	*Is the Fasting Stomach Aspirated?*	*Is the Fractional Method Employed?*	*What Time Elapses Before the Single Evacuation?*	*Is the Entire Residuum of the Meal Aspirated?*	*Is Merely Enough for the Examination Aspirated?*	*Reagents Employed*
City Hospital, New York	16 hours	2 slices toast 1 cup tea	No	No	45 minutes	No	Yes	Free acid: Töpfers Total acid: Phenolphthalein
Cook County Hospital, Chicago	Overnight	1 cup tea without sugar 1 piece of toast without butter	No	No	60 minutes	Yes	No	As above
People's Hospital, New York	Overnight	1 roll 1 glass of either tea or water	Only if retention suspected	Occasionally —— Aspirations every 10 minutes	30 minutes	Yes	No	As above
Harper Hospital, Detroit, Mich.	12 hours	1 shredded wheat biscuit 400 c.c. water	Yes	Yes Aspirations every 15 or 30 minutes	60 minutes	Yes	No	As above
Beth Israel Hospital, Newark, N.J.	12 hours	2 heaping teaspoonfuls of cracker meal 1 glass of either water or tea	Yes	Yes Aspirations every 20 minutes for 2 hours			Yes	As above
Passavant Hospital, Pittsburgh	12 hours	1 slice of bread 300 c.c. water	Yes	No	60 minutes unless achylia suspected	Yes	No	As above
Newark City Hospital, Newark, N. J.	12 hours	1½ thick slices stale bread (60 gm.) 1½ glasses water (300 c.c.)	Yes	Yes — Aspirations } 45-50 minutes after meal every 15 or 20 minutes until free acid found or stomach empty	60 minutes	Yes	No	As above
Montefiore Home and Hospital, New York	Overnight	4 soda crackers 2 glasses water	Yes		45 minutes	Yes	No	As above
Lincoln Hospital, New York	Overnight	2 slices of toast 1 glass tea	Yes	Rarely used —— Aspirations every 15 min.	45 minutes	Yes	No	As above
Jefferson Hospital, Philadelphia	12 hours	2 half inch slices of white bread without crust 350 c.c. tea	Yes	Yes —— Aspirations every 15 minutes for 2 hours		Yes	No	As above
French Hospital, New York	Overnight	1 roll 1 glass water	Yes	No	45-60 minutes	No	Yes	Free acid: Methyl orange Total acid: Phenolphthalein
Broad Street Hospital, New York	Overnight	1 piece toast 1 glass water	No	No	45 minutes	Yes	No	Free acid: Töpfers Total acid: Phenolphthalein
Vanderbilt Clinic, New York	7 hours	4 soda crackers 4 paper cups of water	Yes	No	45 minutes	Yes	No	As above
Massachusetts General Hospital, Boston	15 hours	1 slice of bread of moderate thickness without crust 1 glass water	Yes	Yes, on one service —— 3 aspirations at ½ hr. intervals	Yes, on another service —— 60 minutes	Yes	Yes, when fractional method is employed	Free acid: Töpfer's Total acid: Phenolphthalein
Mayo Clinic, Rochester, Minn.	Overnight	8 arrow-root biscuits 400 c.c. water	No, except in special cases	Yes, beginning after one hour, aspirations every 15 min.	60 minutes	If free acid, entire amount, and always empty stomach on last aspiration	No	As above
Fordham Hospital, New York	17 hours	Either a roll, or 2 pieces of dry toast 250 c.c. water	No	No	45 minutes	Yes	No	As above
Bellevue Hospital, 3rd Surgical Division, New York	Overnight	Heaping tablespoonful of oatmeal and one quart of water boiled down to one pt.	Yes	Yes 2 aspirations at one hour intervals		Yes	No	As above
Lebanon Hospital, New York	Overnight	1 roll 1 glass tea	Yes	Yes —— Aspirations every 15 minutes for 2 hours	45 minutes	Yes	No	As above

Chart showing the results of replies received from hospitals in answer to personal inquiries made concerning the test meals employed. At St. John's Hospital, Long Island City and St. Vincent's Hospital, Erie, Pa., these methods are not employed, as they are considered of slight importance. In no instance are the components of the test meal weighed or measured in these hospitals except at the Mayo Clinic, and here it is not done each time.

11. In doing the quantitative tests, what reagent or reagents is used for the determination of the free hydrochloric acid, the combined hydrochloric acid, and the total acidity?
12. Are there any tests made for organic acids, other than that usually made for lactic acid?
13. What is the attitude of your staff concerning the value of gastric analysis?

In addition the literature on the subject was surveyed and personal inquiries were made in order to obtain a comprehensive conception of the test meals employed.

In the appended chart the results of the replies received from twenty hospitals scattered in the East and West are presented. The period of fasting in every instance is adequate, overnight is the usual length of time. But the components of the test meal vary markedly. By referring to the chart it is seen that there is a striking difference in the meals employed in each of the hospitals recorded. This same discrepancy holds true of the meals used by individuals in both their office and hospital practice. In none of the hospitals is the meal accurately weighed and measured; but in private practice and the literature consulted, it was noted in a few instances that this precaution is taken. The fasting stomach is aspirated in most instances, although in four of the hospitals this important and instructive procedure is omitted. Where the single evacuation of the meal at the end of a stated interval is made use of, which is in seventy-five per cent. of the hospitals studied, the interval of time varies from thirty to sixty minutes, forty-five minutes is the average. Some hospitals and individuals employ both the fractional and single evacuation methods, but the latter seems to be favored. Seventy per cent. of the hospitals aspirate the entire residuum of the meal at the end of whatever interval of time they employ. With but one exception the reagents employed for the quantitative estimation of acid are identical. The opinions as to the value of this procedure varied a good deal, but the consensus of opinion seems to be that it is an aid to diagnosis in certain cases, such as achylia.

VARIATIONS IN TEST MEAL.

It is clear from this summary that there are marked variations in the test meal, and that those meals in common use vary considerably. Toast, cracker meal, gruel, crackers, indefinite sized slices of bread, water, tea, shredded wheat, etc., are used; nor is it to be assumed that these components are weighed and measured accurately. Obviously slices of bread differ widely in weight, depending upon the individual making the slice; toast is made from either fresh or stale bread, which differ chemically, the stale bread being more sour, that is, contains more organic acid (14). And so on. One can enumerate the deficiencies of the many variations of the Ewald meal. Yet when observers report their results, and state that the Ewald meal was used, we are told in some instances of what the meal consists, while in others we are not; with the result that a comparison of the results obtained are rather contradictory. Rehfuss and Hawk (16) assert "that there is absolutely no value in a complexity of test meals which only introduces confusion to a subject already sufficiently complex."

Quoting again from Rehfuss and Hawk (16) "one of the greatest drawbacks in gastric analysis is the lack of standardization," and further on these same observers state (16) that "we have only begun to realize the possibilities of gastric analysis." Are we going to increase our knowledge in this field by individual or combined effort? Decidedly the latter. When we have a number of persons doing the same thing in the same way, we learn, for in this way the faults and good points of the problem are brought out and corrected. So it is with gastric analysis. We should all use the same test meal, wait the same length of time before aspirating, use the same type of tube, and employ the same chemical reagents in examining the contents. Then we will begin to see the shortcomings of our meal, and be able intelligently to correct them. In this way gastric analysis will be brought up to its proper rank of importance as a diagnostic aid. If we are to elevate gastric analysis to the place it deserves as as aid in diagnosis, standardization is of the utmost importance. We must rid ourselves of the encumbrance of too many modifications of the test meal. Let us agree on one meal and accept this as standard, and then let us conscientiously employ this meal and report our results with it. Certainly this is a logical way of going about investigating the usefulness and limitations of a given procedure. By standardization we may hope to add to our present faulty understanding of the physiology and pathology of the stomach.

What better way is there for the determination of stomach function and dysfunction than the introduction into the stomach of certain known chemicals, that is, the test meal? Then after a definite interval of time, the aspiration of these altered chemicals from the stomach, and their careful examination. Chemistry is exact, and under like conditions two reacting chemicals will always give the same end reaction. The combination of hydrogen and chlorine under favorable conditions will always give hydrochloric acid and nothing else. If we know the chemical composition of the test meal we are employing and then the altered chemistry of this meal after its sojourn in the stomach for a definite length of time, we are in a position to judge, at least in part, the complex chemical changes which our meal undergoes in the course of its digestion by the stomach. The chemistry of the stomach is complex enough, and by using certain known chemicals (a standard test meal) we make our problem of investigation a little easier. Can it be assumed that tea and gastric juice will give the same result as water and gastric juice? It cannot. We are dealing with chemicals and chemistry and we must always employ the same reagents to obtain comparable results. "It is clear that the gastric response varies with the type of the meal and there is more or less specificity in the response to various foods" (17). The test meal is the best means we have to determine the chemistry of the stomach, it is also invaluable in giving us information about the motor activity of this viscus. Finely divided chyme has not the same significance as has coarse food particles, nor the recovery of ten c. c. the same import as the recovery of one hundred c. c. Nor does red or green colored contents mean the same as white or cream colored contents.

TYPE OF TUBE USED.

The question of what tube to use for aspirating the stomach is and has been extensively discussed, and much can be said for both the Ewald and the Rehfuss tubes. But the fractional method, while probably a good one for determining the secretion of the stomach, tells us little of its motor activity unless employed over a period of two to three hours. Also it has been argued that the tube collects secretion from but one part of the stomach, and that the gastric contents is not a homogeneous fluid (21), and little can be learned of the solid portion of the meal, unless finely divided, for coarser particles will not enter the tube because of its small calibre. It is not within the scope of this paper to argue the pros and cons of this controversy; however, it seems to me that the Ewald tube is the better of the two, and that it should be employed at the end of a definite interval. The author agrees with Gorham (11) that in order to speak of a quantitative gastric analysis the stomach must be completely emptied at a definite time after a standard test meal.

As a standard test meal why not go back to, or rather continue to use the Ewald test meal, described many years ago (8); but let us not use either tea or water as Ewald suggests, but water only. For teas differ considerably from each other, depending upon the locality from which they come, and the time and method employed in brewing. Our standard meal then will consist of thirty-five grams of fresh roll and three hundred c. c. of tap water, accurately weighed and measured. This meal to be fed to the patient after. a period of fasting of at least six hours. Prior to the feeding the fasting stomach is to be aspirated, and if residue be found, the stomach is to be washed until it is clear of residue. Now the patient is fed the meal in the doctor's office, the clinic, or hospital; he is advised to eat slowly and chew his food well, this obviates to a large extent plugging of the tube by coarse food particles. After eating, the patient rests quietly for an hour and then whatever of the meal remains in the stomach is aspirated in its entirety with the Ewald stomach tube and submitted to the usual examinations, physical, chemical and microscopical. This meal is simple, readily accessible, contains all of the foods, namely, albuminoids, sugar, starches, nonnitrogenous extractives, and also salts; it stimulates the flow of gastric juice, it is readily liquefied and so makes its expression through the tube easy; and lastly, we have accumulated knowledge of its value in both normal and diseased stomachs over a period of more than a quarter of a century.

IMPORTANCE OF STANDARDIZED METHODS.

It is interesting to note that in a recent report of the Public Health Administrator of England (15) it is stated that "twenty-five per cent. of all patients seeking relief in our clinics did so for gastrointestinal disorders." Now if the percentage is so high in England, can we not safely assume that it is at least as high here in America? Or even if it is lower, say one out of every six or seven patients who come to us has a gastrointestinal complaint, is it not important for us to have definite standardized methods of procedure in these cases? Do we not owe it to this large group of patients to standardize our methods, so that reliable data may be obtained for them, and thus help in the therapy and diagnosis of those afflicted with gastrointestinal disease? An editorial in a medical journal (6) says: "The situation has become so complicated that many practitioners have frankly confessed their inability to derive as much dependable information from modern gastric analysis as the importance and long maintained prominence of the subject would seem to warrant." Can it not be expected that the standardization of the test meal will tend to make this subject less complicated, and the results obtained more dependable?

SUMMARY AND CONCLUSION.

There is a definite lack of standardization of test meals for which there is no evident good reason. Standardization is not a difficult matter and should be brought about. It has been suggested that the Ewald meal, consisting of thirty-five grams of fresh roll and three hundred c. c. of tap water, be used. This meal to be weighed accurately and measured and eaten in the doctor's office, clinic, or hospital. Before feeding, the fasting stomach is to be aspirated and freed of residue, if there is any. Then an hour after the ingestion of the meal, it is to be entirely aspirated and subjected to the usual chemical, physical and microscopic tests. It is not contended that this meal is the best meal that may be devised, but it is true that much excellent work has been done with it for over twenty-five years and therefore our accumulated knowledge concerning it is very great. The prevalence of gastrointestinal disease has been hinted at.

In conclusion I wish to express my gratitude to those physicians who have so freely given me the information that has made this paper possible.

REFERENCES.[1]

1. AARON, C D.: *Diseases of the Digestive Organs*, Lea, & Febiger, 1921.

2. BEST, E. J.: Fractional Examination of the Stomach Contents, *Journal A. M. A.*, 67, 1083, 1916.

3. CROHN, B. B, and REISS, J.: Studies in Fractional Estimation of Gastric Contents, *American Journal of the Medical Sciences*, 154, 857, 1917.

4. *Idem: Ibid*, 155, 801, 1918.

5. EDITORIAL: The Value of Gastric Analysis, *Journal A. M. A.*, 78, 512, February 18, 1922.

6. *Idem*: Critique of Gastric Analysis, 77, 202, *ibid*, July 10, 1921.

7. EINHORN, M.: *Diseases of the Stomach*, William Wood & Co., fifth edition, 1911.

8. EWALD, C. A.: *Diseases of the Stomach* (Manges), D. Appleton & Co., second edition, 1897.

9. FEIL, H.: Clinical Value of Fractional Analysis of Gastric Secretion, *Ohio Medical Journal*, 13, 327, 1917.

10. FISHBAUGH, E. C.: Fractional Determination of Gastric Secretion, *Journal A. M. A.*, 67, 1275, 1916.

11. GORHAM, F. D.: Variations of Acid Concentration in Different Portions of the Gastric Chyme, and Its Relation to Clinical Methods of Gastric Analysis, *Archives of Internal Medicine*, 27, 434, April, 1921.

12. HEMMETER, J. C.: *Diseases of the Stomach*, P. Blakiston's Sons & Co., second edition, 1900.

13. KEMP, R. C.: *Diseases of the Stomach and Intestines*, W. B. Saunders, second edition, 1910.

14. KNAPP, M. I.: Organacidia Gastrica, *Medical Record*, 62, 361, September 6, 1902.

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[1] A complete list of references will appear in the author's reprints.

FERNAND WIDAL.

By MALFORD W. THEWLIS, M.D.,

Paris.

Cochin Hospital, Paris, is a busy institution. Doctors and students from all parts of the world are seen in the clinic of Professor Fernand Widal, one of the foremost clinicians whose name is known the world over, not only on account of the reaction for typhoid fever, which he discovered, but on account of his many other investigations.

Widal holds the Laureate of the Institute and Laureate of the Faculty of Medicine, Laureate of the Academy of Medicine, besides many other titles. In 1886, 1887 and 1888 he was demonstrator of pathological anatomy at the Faculty, and from 1889 to 1895 gave a practical course of bacteriology at the laboratory of Professor Cornil.

Before 1886, when Widal, in collaboration with M. Chantemesse, made investigations on typhoid fever, not much was known about the bacteriology of this disease. Eberth had discovered bacilli on cuts of spleen and mesenteric ganglions; Fränkel and Simmonds asserted that they had injected mice with Eberth's bacillus; Michaël and Moers had discovered in water the presence of a microbe analogous to that of Eberth, but their assertions were attacked by the school of Pettenkofer. Such was the state of things when Widal began his work and from 1886 he made various studies upon the bacteriology of typhoid fever and proved that Eberth's bacillus was the specific organism of this disease. He later contributed, with M. Chantemesse, to the determination of the rôle of drinking water in the production of typhoid. On June 26, 1896, he made a report to the Medical Society of Hospitals, showing how to make an accurate diagnosis of typhoid fever in a few minutes. When Widal began the researches of serodiagnosis the phenomenon of agglutination had already been studied for many years, but up to that time agglutination had always been regarded as a reaction which appeared only in the immunized animals and this conception prevented medical men from grasping the significance of the phenomenon for the diagnosis of diseases. Widal proved that the antitoxic, bactericidal and agglutinating properties were often coexisting but could also be dissociated in the same serum and that the different qualities acquired by a serum during the infection, though they sometimes seem to be on a par, are relatively free from one another.

FERNAND WIDAL.

Serodiagnosis of typhoid fever was made simple by Professor Widal, as he states "a simple and rapid method, which requires no elaborate material, not even stains. All that is required is a pure broth culture of Eberth's bacilli, which can be kept for weeks, a microscope with an immersion lens, and a drop of blood or of serum from the patient." Widal and Sicard noted, further, that the agglutinative reaction is obtained not only with typhoid serum, but also with other secretions from typhoid patients—serous fluid of blisters or of edema, tears, bile, and exceptionally, urine.

Widal's researches in cytodiagnosis are important; cytodiagnosis of tuberculous meningitis; also of tabes. Typhoid pleurisy was the subject of an interesting investigation; others were the "cold suppuration in typhoid fever;" specificity of typhoid osteomyelitis; diseases caused by colon bacilli, paratyphoids, bacillary dysentery, and important studies on the affections caused by various organisms.

In a surgical room where there was endemic tetanus, M. Widal showed that the infectious agent seemed to reside in the joints of the flooring under the beds, and showed that puerperal tetanus was of the same nature as the surgical type.

The communications Widal has made, with Lemierre, on the rôle of sodium chloride in the pathogeny of edema of nephritis and the dechlorination cure for Bright's disease, proposed by Widal and Javal, added a most important chapter in the treatment of diseases of the kidneys, as well as that of edema from other causes. On June 19, 1903, Widal announced an important contribution, on the retention of sodium chloride in cardiac edema, and in collaboration with Javal, on June 26, 1903, in the same bulletin, there was published an article on "the cure by dechlorination. Its action on edema, on hydration and on albuminuria and certain periods of epithelial nephritis."

Widal and his pupils have proved the rôle played by chloride of sodium in the production of edema in Bright's disease. They have proved that salt is a dangerous element in many cases. Widal also studied dechlorination in cardiac diseases and the whole investigation covers a mass of scientific work which is of great use in the treatment of these diseases. He made experimental researches on the treatment of diphtheria and noted the effect of antitoxin in preventing this disease. He also found that the germs of tuberculosis can persist a long time in river water.

His teachings cover almost every disease, including diseases of the kidneys, liver, spleen and digestive tube, diseases of the blood, and perhaps one of his most important recent studies is on diseases of the kidneys. In an article of this length it would be impossible to mention all of his important researches. He has a remarkable didactic gift and one always leaves his clinic greatly stimulated. His weekly conferences are attended by physicians from all parts of the world; he devotes an hour to one disease and his lecture begins with the exhibition of a patient and the discussion is built up on this clinical study. He is, undoubtedly, one of the greatest clinicians of the world.

Editorial Articles

THE PATHOGENESIS AND TREATMENT OF PHLEGMONOUS GASTRITIS.

The pathogenesis of phlegmonous gastritis would seem to be a simple matter. The bacteria usually penetrate the mucosa by way of an ulceration or a more or less extensive erosion. Contamination may also ensue from a peritoneal fissure and eruption of pus into the gastric cavity. It may likewise result from swallowing pus coming from an abscess in the throat, the esophagus or mediastinum opening into the gullet, or from purulent sputum derived from the bronchi or lungs. It is to be noted that the bacterium found in the pus from the bronchi is the same as that found in the stomach and that among a number of cases of pneumococcal gastritis three succeeded pneumococcal bronchopneumonia (Loeper).

Propagation may also take place by way of the lymphatics, along the walls of the esophagus or cardia. Certain esophagitides extending under the mucosa, or peritoneal pus foci in contact with a gastric ulcer or neoplasm, diffuse the infection in the gastric walls by way of the lymphatics. These pathogenic mechanisms explain a large number of cases of phlegmonous gastritis, but not all, and although a point of entrance may be present in the gastric mucosa, the infection may be an indirect one by way of the blood. A cutaneous or visceral focus of suppuration which harbors the streptococcus or staphylococcus may result in the bacteria reaching the stomach—normal or pathologically changed—where they develop. A simple or neoplastic gastric ulcer may serve as the point of election and hence become secondarily infected. A normal stomach is not immune to pyemic infection.

This is the only explanation which can be offered for gastric infections or abscesses arising in puerperal infection, scarlet fever, prostatitis, erysipelas and pyemia. In their experimental work carried on some time since, Loeper and Esmonet found streptococci and the tubercle bacillus in the walls of the stomach following intravenous injections of these bacteria, and they even detected inflammatory foci composed of considerable masses of polynuclears in the submucosa of the stomach, cecum, and large intestine. Hayem discovered pneumococci in the gastric submucosa in a case of bronchopneumonia and Dieulafoy, in general infections due to this organism. Théohari, Enriquez and Hallio found that intravenous injections of the toxins themselves produced lesions of the gastric walls. In some instances the pneumococcus or streptococcus has been found in the blood before the gastric phlegmon had become clinically manifest. Hence, contamination by the blood is possible and a preexisting gastric lesion is not always necessary or sufficient for producing the phlegmonous process. The frequency of gastric lesions giving rise to phlegmonous processes of the stomach require prophylactic therapeutics, such as lavage and antisepsis of the organ. Broths and meat of every kind should be abstained from so long as any lesion of the gastric mucosa exists, and above all when it gives rise to hemorrhage. Sodium bicarbonate and especially bismuth, limewater and sodium chlorate are decidedly indicated, because they protect the lesions and hamper the development of bacteria. The mouth and respiratory tract should be carefully looked after in order to avoid swallowing septic matter. Horse serum, being both coagulant and leucopoietic, may find its indications.

Phlegmonous gastritis once diagnosed, resection of the diseased portion of the stomach is about the only logical treatment and very few recoveries have been obtained by it. The pathogenic agent of phlegmonous gastritis is more frequently the streptococcus than the pneumococcus and little reliance can be placed on antistreptococcal serum, but the outlook from the use of antipneumococcal serum is more promising if the gastric infection should be due to that organism.

SURGICAL TREATMENT OF ASCENDING STERCORAL STASIS.

Constipation is met with in two very different forms. Retention in the right colon is accompanied by general disturbances due to intoxication and sometimes to infection of the organism; in the left colon, which is the usual form of constipation, it is a purely mechanical disorder. This difference is manifest if the movements and innervation of the intestine are studied, as has been done by Elliot and Smith, Boehm, Keith, to mention only the most important researches. Goiffon, in a series of experiments, has studied the composition of the intestinal contents in the different segments of the colon. In a subject placed on a mixed diet the cecal contents are characterized by the presence of starch, carbohydrates, partially digested muscle fibres and fat cells, especially the fatty acids, bacteria, and numerous iodophile clostridial bacteria; they are acid in reaction. In the descending colon starch and carbohydrates have disappeared; muscle fibres are few, as well as the iodophile clostridial germs; reaction is neutral or alkaline. These differences explain the symptomatology of right or left stercoral stasis. Stagnation of feces in the right colon favors the development of toxic products from albuminoids, fats and carbohydrates. Bacteria may also enter the lymphatic circulation and give rise to complications.

The symptoms of constipation in the right colon are pain in the right iliac fossa and right hypochondrium. The lameness is permanent, and is increased by muscular involvement and prolonged erect position, especially during periods of constipation. Pain is often worse at night (two to three a. m.) at the time of repletion of the cecum and right colon by alimentary residue. Pain is very severe when gas fermentation distends the proximal colon which then forms an appreciable bulging under the abdominal walls. The pain extends to the infrahepatic region and right thigh.

The second symptom is chronic constipation interspersed by diarrheal debacles. Examination at the time of the diarrheal attacks will be negative if the colonic mucosa is normal, inasmuch as the stools will present the character of the normal contents of the cecum—rich in starch and cellulose, iodophile flora, and with an acid reaction. If the mucosa is pathologically changed the feces on the contrary are dark colored, fetid, and alkaline in reaction, because there is only a small amount of fatty acids and much ammonia. If the mucosa is much inflamed, there will be a continual false diarrhea. The stools are pasty and fetid, but by coprological examination they will show signs of relative colonic retention, absence of cellulose and starch indicating that in spite of their richness in water the stools have sojourned for some time in the colon. Radiology reveals stagnation of the feces in the right colon.

Thirdly, the toxic accidents. At the time of constipation the patient complains of various disturbances; headache, vertigo, nausea, abdominal malaise, an anemia sometimes serious, and occasionally icterus of hemolytic origin (Loeper); cholemia is frequent in these patients. Cerebral intoxication is made evident by the usual asthenia and nervous depression present in these cases. The tongue is coated, appetite poor and blood pressure low. The infectious accidents consist of slight pyrexia and infection of the gallbladder or kidneys. Palpation of the right colon shows its mobility, distention and sensitiveness—a painful spot over the cecum and right colonic angle and pain in the right colon when the left colon is palpated.

Medical treatment is that employed in chronic constipation. Surgical treatment should be reserved for the more serious forms. Abnormal mobility of the colon is dealt with by colon fixation, while in strangulation by a pericolonic membrane the latter is to be excised. When at the same time there is mucous colitis cecosigmoidostomy is indicated for drainage of the dilated and infected colon. This operation does not interfere with the normal junctions of the colon as it merely drains off the abnormal products stagnating in its declivous segment. Recovery is slowly progressive but it is necessary to watch the intestinal junctions during this time.

ATTACKING EPIDEMICS AT THEIR SOURCE.

A commendable effort is being made by a group of public spirited citizens of New York, under the leadership of Dr. Royal S. Copeland, commissioner of health, to raise a sum of money sufficient to defray the expense of sending a sanitary relief expedition to Eastern Poland where danger is feared from the spread of contagious diseases, such as typhus, cholera and bubonic plague. With a view of arousing needed interest in the subject among the laity, Commissioner Copeland addressed recently a gathering of newspaper men at the New York Press Club, taking for his topic New York's Imminent Peril from Europe's Typhus Cholera Plague. By means of large maps especially drawn and colored he exhibited the geographical distribution of contagious diseases in eastern Europe, the Mediterranean ports and the islands between North America and the Mediterranean, and by buttons of different colors he indicated the starting points of typhus, cholera and bubonic plague in different regions.

It was shown that the germs of typhus were being carried into Poland and swept over into Germany by vermin infested peasants of Poland who had been previously driven into Russia by war and were now returning, bringing typhus and cholera in their train. Dr. Copeland made a number of valuable suggestions to his journalistic auditors in the way of getting them to enlist the support of people of wealth in financing a plan to destroy epidemic diseases at their source. A group of doctors and nurses might, he said, be recruited and sent to a point in Eastern Poland, preferably a railroad junction town, where immigrants coming in from Russia could be deloused and the town itself and its environs be cleaned up and put in sanitary condition.

For the work of protecting New York and the rest of the country by attacking epidemic diseases at their source in this way, the sum of $25,000 is needed for the equipment of one unit. If New York will do this, other cities such as Boston, Philadelphia, Detroit, Chicago, St. Paul, Minneapolis and San Francisco may be inspired to take similar action. If one hundred cities would do this and each group undertake to bring about the sanitary regeneration of ten miles of border territory, it would mean that one thousand miles of the border between Russia and Poland, where the dreaded epidemic diseases originate, would be converted into a sanitary barrier between disease stricken Russia and western Europe and the western hemisphere.

It is pertinent to observe that on the same day the newspaper men of New York were addressed by Dr. Copeland, it was made known by press dispatches that cholera had made its appearance in Armenia and in Georgia, and Dr. J. K. Marden, of Boston, Mass., speaking for the American Near East Relief Commission, has since reported cases of cholera at Tiflis, where a dangerous epidemic is expected unless the people can be mobilized to take measures for controlling the spread of the disease.

A committee of which Health Commissioner Copeland is chairman has been organized, with Archbishop Hayes and Bishop Manning lending their support and encouragement. Others who are taking a prominent part in the work include Charles K. Gilbert, Social Service Commissioner; James R. McAfee, Society of Friends; Lauritz Larsen, National Lutheran Council; Henry H. Bizallion, Gotham National Bank, Elizabeth Marbury, John M. Fitzgerald and Nathan Strauss. The treasurer of the committee is Herman A. Metz, 122 Hudson Street, New York, to whom checks should be made payable.

NEW CONCEPTIONS OF TREATMENT.

It seems that, in many respects, methods of treating disease are undergoing such a change that it may almost be termed revolutionary. Sir James Mackenzie is largely responsible for these new conceptions of treatment. His view is that in order to prevent apparently slight complaints from developing into disease, or even before there are any obvious manifestations of deviation from the normal, steps should be taken to check their progress. The first volume of reports of the St. Andrew's Institute for Clinical Research, founded and presided over by Sir James Mackenzie, was issued recently. The essence of the doctrine preached by the founder is expressed by Professor Hering, of St. Andrew's University, in the following words. "The body furnishes an apparatus more sensitive than any laboratory instrument, and the slightest deviation from the normal reveals itself in altered reflexes before the most elaborate physical and chemical tests are applicable." That is to say, before many of the present methods of detecting disease can be employed, disease is present and is proclaiming its presence. It is proclaiming it by a disturbance of what are called reflexes, or, if you will, responses of the patient to life. The patient's relationship to the world he lives in is altered. It follows that if we would detect the earliest signs of disease we must know the "mechanism" of living in a wide and broad sense. This, however, is exactly where our medical knowledge is so weak. In consequence, when changes occur in a man's or woman's method of responding to life, we are often unable to understand them, and so the signal of danger is missed. It is obvious that the only doctor who is at all likely to see these small early changes is the family doctor, the man people go to with their smallest complaints. He therefore must undertake the new research work into the earliest signs of disease.

The volume just published affords a new law, a new conception. Dr. MacNair Wilson, in a book published a short time ago on heart disease, expressed Sir James Mackenzie's and his own views, with regard to this new law and new conception, very clearly. He takes an analogy: When a strong man is hit, he hits back. There are then two events: there is the blow with its effect and there is the response to the blow, the recoil, with its effects, which normally should equalize the effects of the blow. We are hit in a multitude of different ways, yet to each "blow" or stimulus we must make an adequate response. In fact, while we are healthy we do make an adequate response to every stimulus. It follows that any falling off of response, any inadequacy, will represent a deviation from health, assuring that the blow or stimulus remains as before. In short, feeling sick is feeling unable to cope with life, to give it blow for blow.

At the present time our conception of and attitude toward disease is altogether different from this. Symptoms of disease are regarded as something separate from ourselves and treated accordingly. Disease may proceed from a psychological cause, from a toxic cause, from a mechanical cause or the bodily organs themselves may have broken down. However, this is the least likely, because disease of organs is usually a slow process, which comes at the end of an illness and not at its commencement. In spite of this patent fact the practice of medicine is mainly concerned with the disease of organs. This is to say, when there are deviations from the normal and a physician is consulted the tendency is to suspect and look for advanced disease of organs, when in many cases the organs are sound.

Sir James Mackenzie and his disciples insist that the rational treatment of disease consists in preventing it from developing. And this must be effected by early diagnosis, by detecting symptoms even before they have taken shape, and suppressing them before they have had the opportunity of making themselves troublesome. Moreover, it is pointed out that the general practitioner being the only man who can detect early symptoms, because he is the one who has the chance of observing them, must be taught how to diagnose the very earliest symptoms of disease. Of course, it is immensely difficult thus to diagnose, for the reason that it is a task of the greatest magnitude to teach the general practitioner how to do it. He must understand the new research work into the earliest signs of disease. Sir James Mackenzie and his coadjutors have taught him to begin to do so and the reports of the St. Andrew's Institute of Clinical Research supply remarkable testimony to the value of his efforts.

THE CANCER SITUATION.

There is no disease which afflicts mankind, and especially the civilized portion, which arouses such great dread as malignant disease in its several forms. It is truly a terrible malady and one which for many reasons does not admit, in too many instances, of effective treatment. As a rule, except in certain cases in which the manifestations are superficial, the disease has made such progress before diagnosis is made and aid given, that medical science can do little even for the relief of the patient. In the early stages and if the locality in which the tumor is situated is favorable for surgical intervention cures are sometimes made and, in any event, life is frequently greatly prolonged; but unfortunately the diagnosis of malignant growths in their early stage is not made as often as is desirable.

So far as the origin of cancer is concerned research in this direction has been busy for many years and occasionally it has seemed that we were on the eve of solving the mystery. But little has come of the earnest and enthusiastic labors of scientists in all parts of the world, except that some of the paths traversed appear to have been blind alleys and the field of research has been narrowed considerably in consequence. In this country, perhaps, more is being done in the attempt to determine the cause of cancer than anywhere else, and money has been forthcoming freely in order that research may be prosecuted under the most favorable auspices. All this energy, time and money expended without stint augurs success in the final result, although it may be long in coming.

A notable collection of articles by authorities on the subject of cancer appeared in the April 5, 1922, issue of the *Medical Press*, London. Sir Arbuthnot Lane dealt with the relation to cancer of alimentary toxemia, arising from long continued intestinal stasis, and suggested that such a poisoning might be an exciting cause of the disease in those who were predisposed. He believes, unlike others who have studied the question, that cancer is essentially a malady of civilized life brought about largely by excessive eating and by eating food not adapted to man's requirements. He points to Colonel McCarrison's evidence concerning natives of India, that as long as they consume simple food and lead a simple life generally, they are free from malignant affections, but that when they become prosperous and copy the food and the habits of the white man they suffer in the same way as he suffers. He insists, in short, on the necessary causal relationship between chronic intestinal stasis and all forms of cancer, other than the cutaneous varieties, which are obviously produced by heat or by some definite mechanical or chemical irritant. Logically, therefore, the great English surgeon argues that cancer is, at least to a great extent, a preventable disease.

Sir John Bland-Sutton contributed an article on the microflora of cancer and appeared to favor somewhat the theory that cancer was of parasitic origin, emphasizing in support of this theory the proneness of cancer formations to undergo bacillary invasion. Sir G. Lenthal Cheatle, who has done splendid research work on the pathology of breast cancer, discussed in a thoughtful and able article the question of its endogenous and exogenous causation from the viewpoint of irritation. Also, he gave as his opinion that the internal secretions must be regarded as of immense importance in the study of any form of growth including cancer. Dr. W. S. Lazarus-Barlow dealt with radium treatment of malignant disease in an illuminating but restrained manner. He drew attention to one result from radium treatment, not immediately obvious, which he believed would be of real benefit to the patient. This was that the fear of operation was so real to the public and the belief that cancer meant an operation was so universal, that patients often deferred seeking medical advice until the growth was inoperable. As soon as men and women began to realize that an abnormal condition in themselves which they feared might turn out to be a cancer did not necessarily mean a surgical operation, it was probable that they would seek medical advice earlier.

Dr. J. A. Shaw-Mackenzie discussed cancer therapy in relation to physiological research in a very suggestive manner. Dr. Reginald Morton contributed an article in which he proclaimed his belief in and enthusiasm for the Erlangen technic of the x ray treatment of malignant disease. His faith was founded not only on what he had seen in Germany, but on the results he himself had obtained by the method in this country. Mr. E. G. Slesinger further developed the thesis of Sir Arbuthnot Lane that intestinal stasis exerted a very important influence upon the evolution of cancer, and suggested that the relief of intestinal stasis might be a means for preventing malignant disease. Mr. Percy Dunn, a well known surgeon and an editor of the journal in which the articles quoted above appeared, was mainly responsible for the success of the issue. He reviewed the past and the existing situation as regards cancer in an interesting way. The number is well worthy of close consideration from all points of view.

PROPER CREDIT.

Dr. Sydney Wallenstein, of Baltimore, Md., calls our attention to the fact that in his article on The Interpretation of the Wassermann Reaction, published in our issue for May 3d, p. 514, he inadvertently omitted to give proper credit to Dr. Charles F. Craig for the quotations which appear in this article from Dr. Craig's book on *The Wassermann Test*. Dr. Wallenstein wishes it to be clearly understood that this omission was merely an oversight and wholly unintentional.

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News Items.

Southern Minnesota Medical Association.—The midsummer meeting of this association will be held at Rochester, Minn., June 19th and 20th, under the presidency of Dr. W. F. Braasch. The program for the forenoon sessions will consist of clinics and demonstrations at the leading hospitals and the afternoons will be devoted to the reading and discussion of scientific papers. Dr. Aaron F. Schmitt, Physicians and Surgeons Building, Minneapolis, is secretary general.

Congress on History of Medicine.—The Third International Congress of the History of Medicine will be held in London, July 17 to 22, 1922, under the presidency of Charles Singer, M. D., D. Litt. J. D. Rolleston, M. D., is general secretary and those who desire further information concerning the congress should communicate with him. His address is 21 Alexandra Mansions, King's Road, London, S. W. 3. Lieutenant Colonel Fielding H. Garrison, M. C., United States Army, is official delegate from the United States.

National Tuberculosis Association. — The eighteenth annual meeting of this association was held in Washington, D. C., May 4th, 5th and 6th, under the presidency of Dr. James Alexander Miller, of New York. Officers for the ensuing year were elected as follows: Dr. Lawrason Brown, of Saranac Lake, president; Dr. C. J. Hatfield, of Philadelphia, first vice-president; Dr. J. W. Pettit, of Ottawa, Ill., second vice-president; Dr. G. M. Kober, of Washington, D. C., secretary; Dr. H. V. Platt, of New York, treasurer. Dr. Linsly R. Williams, of New York, has been appointed managing director.

St. Mark's Hospital Alumni Association.—At a meeting of this association held at St. Mark's Hospital on Wednesday, April 26th, the following officers were elected: President, Dr. Charles N. Gelber; vice-president, Dr. Frank Tannenbaum; secretary, Dr. I. Glassman; treasurer, Dr. J. Juskowitz; executive committee, Dr. Charles Meinhardt, Dr. M. F. Goldberger, Dr. J. Lewis Amster, Dr. Philip Goldfader and Dr. Jacob Silver.

Technical Photographic and Microscopical Society.—Permanent organization of this society was effected at a meeting held at the Chemists' Club, New York, on Wednesday, May 10th. It is planned to hold a general convention of industrial and microscopical photographers in connection with an exhibition of photographic work, chemicals, and apparatus, which will be held at the Grand Central Palace, during the National Exposition of Chemical Industries, September 11th to 16th.

American Laryngological Association.—Dr. Emil Mayer, of New York, was elected president of this association at the forty-fourth annual meeting held in Washington, D. C., May 1st and 3d. Other officers elected were: Dr. George Fetterolf, of Philadelphia, first vice-president; Dr. Lorenzo B. Lockard, of Denver, second vice-president; Dr. George M. Coates, of Philadelphia, secretary; Dr. Joseph H. Bryan, of Washington, D. C., librarian; Dr. Joseph Payson Clark, of Boston, treasurer.

Brooklyn Cardiological Society.—The final meeting for the season of the Brooklyn Cardiological Society was held at the residence of the president, Dr. William J. Cruikshank, Wednesday evening, May 31st. The paper of the evening was read by Dr. Selian Neuhof on Pregnancy and Heart Diseases. The discussion was opened by Dr. Harold E. B. Pardee and continued by Dr. John O. Polak and Dr. Ralph H. Pomeroy. A general discussion followed which brought out many interesting points.

Personal.—Dr. Thomas Darlington, of New York, was elected president of the American Association for Promoting Hygiene and Public Baths, at the annual meeting of this organization held in Buffalo, N. Y., May 11th and 12th. Dr. Darlington succeeds Dr. Simon Baruch, who died on June 3, 1921.

Dr. Stephen E. Tracy has been elected president of the Obstetrical Society of Philadelphia.

Dr. Louis M. Warfield has been appointed professor of internal medicine at the University of Michigan Medical School, Ann Arbor.

Dr. Harry Vinn Arny, professor of chemistry in the College of Pharmacy, Columbia University, has received the third award of the Remington Honor Medal.

Dr. Francis X. Mahoney has been appointed health commissioner of Boston, to succeed Dr. William C. Woodward, who resigned recently after serving in that capacity since August 1, 1918.

Colonel Henry Page, dean of the Medical School of the University of Cincinnati, and Professor A. P. Mathews, with forty members of the graduating class, were entertained at luncheon by Mr. Charles G. Merrell, president of the William S. Merrell Company, at the Hotel Gibson on May 23rd.

Government Needs Dietitians and Aides in Rehabilitation of Disabled Veterans.—The United States Civil Service Commission states that there is urgent need at hospitals of the United States Public Health Service and establishments of the United States Veterans' Bureau for dietitians and reconstruction aides in physiotherapy and occupational therapy in connection with the rehabilitation of disabled soldiers, sailors and marines. Full information concerning salaries and requirements, and the proper application blanks, may be secured from the United States Civil Service Commission, Washington, D. C.

Associate in Clinical Psychiatry and Psychotherapy.—The United States Civil Service Commission announces an examination for associate in clinical psychiatry and psychotherapy to fill vacancies at St. Elizabeth's Hospital, Washington, D. C., at $2,500 a year, and in positions requiring similar qualifications, at this or higher or lower salaries. The duties of the appointee will be to act as consultant to the different medical services of the hospital. It is desired to secure the services of a person familiar with the modern therapeutic movements in the practice of mental medicine. Applications will be rated as received until July 31, 1922.

American Gynecological Society.—At the annual meeting of the American Gynecological Society, held in Washington, D. C., May 1st, 2nd and 3rd, the following officers were elected for the ensuing year: President, Dr. John A. Sampson, of Albany, N. Y.; first vice-president, Dr. Brooke M. Anspach, of Philadelphia, Pa.; second vice-president, Dr. Frank W. Lynch, of San Francisco, Cal.; secretary, Dr. Arthur H. Curtis, of Chicago, Ill.; treasurer, Dr. Charles C. Norris, of Philadelphia, Pa. Other members of the council: Dr. George Gray Ward, Jr., of New York; Dr. Walter W. Chipman, of Montreal; Dr. Robert L. Dickinson, of New York; Dr. Franklin H. Martin, of Chicago; Dr. R. R. Huggins, of Pittsburgh, Pa.; Dr. Le Roy Broun, of New York.

American Society of Tropical Medicine.—At the eighteenth annual meeting of the American Society of Tropical Medicine held on May 2d and 3d, in Washington, D. C., in conjunction with the Congress of American Physicians and Surgeons of which the society is one of the component organizations, a program of twenty-one papers was presented, the sessions being attended by over sixty members and visitors. Fifty-five new active members and five new corresponding members were elected. The annual meeting for 1923 is to be held at or about the time of the meeting of the American Medical Association in Atlantic City, N. J. The following officers were elected: President, Dr. George Dock, of St. Louis, Mo.; first vice-president, Dr. Sidney K. Simon, of New Orleans, La.; second vice-president, Dr. Joseph F. Siler, of United States Army; secretary and treasurer, Dr. Brayton H. Ransom, of Washington, D. C.; assistant secretary, Dr. Allen J. Smith, of Philadelphia, Pa.; councillor for five years, Dr. Kenneth M. Lynch, of Dallas, Tex.; councillor for one year, Dr. George C. Shattuck, of Boston, Mass.

Brooklyn Ophthalmological Society Organized.—At a called meeting held on May 9, 1922, in the Library Building of the Medical Society of the County of Kings the Brooklyn Ophthalmological Society was organized. The officers elected were: President, Dr. Joseph E. Golding; vice-president, Dr. Ralph I. Lloyd; secretary-treasurer, Dr. Willis M. Gardner. Dr. James W. Ingals and Dr. Henry M. Smith were elected to form with the officers the executive committee. Membership is limited to oculists resident on Long Island. Dues are five dollars a year and meetings will be held bimonthly in October, December, February and April. An annual meeting and dinner will be held in May at which will occur the election of officers.

The Society of Cinematographic Instruction in Medicine and Surgery.—After two years of preliminary experiments and organization work, the society is now an established and incorporated body and has the support of the leading members of the profession. The purpose for which the society was founded was to raise the science of cinematography in its application to medicine and allied subjects, entirely out of the field of commercialism. In this manner it is possible to make this valuable adjunct to teaching immediately available to the individual physician, surgeon and dentist, as well as to institutions which have recognized and taken into account this new factor of actual visualization in connection with the teaching of medicine and allied subjects. The executive office of the society is situated at 105 West Seventy-third Street, New York, and the following officers are in charge: Dr. James S. Edlin, president; Dr. R. Ottolengui, vice-president; Dr. Charlton Wallace, vice-president; Dr. Alfred Kahn, secretary; Dr. Maximilian Lewson, treasurer; Dr. Robert L. Winkley, executive assistant. The inaugural meeting was held on Friday, April 28th; at the New York Academy of Medicine. An interesting program was presented.

Died.

Baright.—In Saratoga Springs, N. Y., on Saturday, May 27th, Dr. Herbert Edwin Baright, aged fifty-four years.

Browd.—In New York, on Tuesday, May 16th, Dr. Ephraim K. Browd.

Childs.—In Paterson, N. J., on Wednesday, May 24th, Dr. John H. Childs, of New York, aged forty years.

Claiborne.—In New York,, on Saturday, May 27th, Dr. J. Herbert Claiborne, aged sixty years.

Davy.—In Dexter, England, on Wednesday, May 10th, Sir Henry Davy.

De Noyelles.—In Albany, N. Y., on Tuesday, May 23rd, Dr. P. Lawrence De Noyelles, aged twenty-eight years.

Maynard.—In Nyack, N. Y., on Monday, May 8th, Dr. Edward H. Maynard, aged seventy-four years.

Roy.—In New York, on Wednesday, May 10th, Dr. Frank Austin Roy, aged sixty-four years.

Shortle.—In Albuquerque, N. M., on Friday, May 26th, Dr. Abraham G. Shortle, aged fifty-one years.

Wyeth.—In New York, on Sunday, May 28th, Dr. John A. Wyeth, aged seventy-seven years.

Book Reviews

DISEASES OF DIGESTIVE TRACT.

Diseases of the Digestive Organs. With Special Reference to Their Diagnosis and Treatment. By CHARLES D. AARON, Sc. D., M. D., F. A. C. P., Professor of Gastroenterology and Dietetics in the Detroit College of Medicine and Surgery. Third Edition, Thoroughly Revised. Illustrated with One Hundred and Sixty-four Engravings, Forty-eight Röntgenograms, and Thirteen Colored Plates. Philadelphia and New York: Lea & Febiger, 1921. Pp. 904.

This third edition of Aaron's well known work on disorders of the digestive tract contains many improvements on previous editions. It is a complete and trustworthy guide to the diagnosis and treatment of some of the most perplexing and trying of all the diseases which the general practitioner is called upon to treat. A number of excellent illustrations have been added and in the text a considerable amount of new material has been incorporated, necessitated by the recent advances in the science of gastroenterology.

X RAYS IN GASTRIC DISEASE.

Die Röntgendiagnostik der Magenkrankheiten. Von Privat-Dozent Dr. M. FAULHABER, Wurzburg. Dritte vermmehrte und verbesserte Auflage. Von Dr. L. KATZ, Berlin-Wilmersdorf. Mit 51 Abb. im Text und auf 2 Tafeln. Halle a.S.: Carl Marhold, Verlagsbuchhandlung, 1922. Pp. 112.

This monograph gives an excellent account of the importance of x rays in the diagnosis of diseases of the stomach. With regard to gastric ulcer Faulhaber expresses himself as follows: "The x ray examination cannot show each case of gastric ulcer, nor is it permissible to exclude the presence of a gastric ulcer on account of a negative finding by the x rays." "The positive signs of gastric ulcer by the x rays are the direct signs, and these are encountered in the minority of cases." "Only the deep, far progressed ulcer can be directly demonstrated by the x rays." . . . "The superficial ulcer is either not discoverable at all or can be assumed as probable by indirect signs." The direct sign of ulcer is Haudek's niche. The book is very practical and is herewith highly recommended.

MECHANICS OF DIGESTION.

The Mechanics of the Digestive Tract. By WALTER C. ALVAREZ, M. D., Assistant Professor of Research Medicine, George Williams Hooper Foundation for Medical Research, University of California Medical School. With Twenty-two Illustrations. New York: Paul B. Hoeber, 1922. Pp. xii-192.

The book contains a study of the differences in irritability of the various parts of the digestive tract. Alvarez noticed, while working on the absorption of gases after their injection into loops of the intestine, that there were differences in irritability in the different parts of the bowel. Thus the jejunum reacted more intensely and promptly than the ileum. To this difference in irritability in a graded way from one end of the digestive tract to the other Alvarez ascribed the downward progress of food in the bowel. It seemed reasonable to assume that material would have to move from the more irritable and active regions to the less irritable and active ones.

These differences of irritability Alvarez showed in excised segments of the stomach and intestines and found that the rate of rhythmic contraction of the muscles is graded downwards from the pylorus to the ileocecal sphincter. He believes that the peristaltic action of the intestines is a result of the graded rate of the rhythmic contraction of the muscles and is controlled secondarily by the different nerve plexuses.

With regard to the stomach, Alvarez expresses himself as follows: "The muscle of the lesser curvature near the cardia is soft to the touch like coagulated fibrin; that in the pyloric antrum is tough like gizzard and has a different color. If we stimulate the two with an electric current or with a pinch, we get two entirely different contraction curves; and if we put them into warm oxygenated Locke's solution we get two different types of rhythmic activity. These differences should be expected when we remember that the upper and lower ends of the stomach have different kinds of work to do. The upper end serves largely as a hopper to hold the food; the lower as the mill to do the heavy work."

Vomiting, belching, regurgitation, heartburn, nausea, coated tongue and foul breath are all ascribed to disturbances of the right gradient and to some retroperistaltic waves. The book contains a great deal of original material, is of great interest, and can be recommended.

VITAMINES AND FOOD SUPPLY.

The Vitamines. By H. C. SHERMAN, Professor of Food Chemistry, Columbia University, and S. L. SMITH, Specialist in Biological and Food Chemistry, United States Department of Agriculture. American Chemical Society Monograph Series. New York: The Chemical Catalog Company, Inc., 1922. Pp. iii-273.

The volume under review was written for the purpose of summarizing the present knowledge of the chemical nature of vitamines in as judicial a manner as possible. The authors show little sympathy with the scientist who refrains from an endeavor to appraise the importance of vitamines until they have been separated in pure condition. They express the hope that the present work may do something to stimulate quantitative research as distinguished from the merely qualitative tests which have now largely served their purpose, and at the same time that it may serve to present the chief facts not known in such a way as to show their true significance and avoid exaggerated impressions.

Though the larger part of the work was written early in 1921, certain parts have been brought down to the end of that year. There are five chapters, covering over two hundred pages of text, in addition to which there is a bibliography of about a thousand titles. The chapter on vitamines in the problem of food supply, is most instructive and interesting, even to the layman, who can read this chapter with much profit. On the whole, the authors have produced a most readable work which covers this important subject fully and entertainingly. The key to the work may be found in the concluding statement of the authors that they believe that with a dietary selected to make the best use of our ordinary staple foods there will rarely, if ever, be occasion to purchase vitamines in any other form, or to give greater anxiety to the vitamine than to some other factors which enter into our present conception of nutritive requirements and food values." Because of their sane and conservative attitude toward the problem of the vitamines, this work may be recommended as a safe guide in the study and practical application of the problems involved in our food supply.

HEMOLYTIC ICTERUS.

Pathologie und Therapie des hämolytischen Ikterus. Von Prof. Dr. M. Mosse, Berlin. Halle a. S.: Carl Marhold, Verlagsbuchhandlung, 1921. Pp. 50.

Mosse gives a detailed description of hemolytic icterus. The family or congenital type represents the mildest form of this disease. The spleen is by some clinicians held responsible for the development of hemolytic jaundice, as this organ is usually considerably enlarged and diseased in this form of the disease. Splenectomy has frequently effected a cure. The monograph can be highly recommended.

SURGICAL CLINICS.

The Surgical Clinics of North America. Philadelphia Number. Volume II, No. 1. With One Hundred and Forty-five Illustrations. Philadelphia and London: W. B. Saunders Company, 1922. Pp. 331.

In this issue of the *Surgical Clinics,* the publishers have once more earned the thanks of the medical profession for the most interesting and useful volume which they have brought forth. Eighteen Philadelphia surgeons are represented in these clinics. A. P. C. Ashhurst presents nine cases of unusual interest, J. B. Deaver six cases, described in his inimitable manner, and the other clinics are no less attractive both in substance and in manner of presentation. The illustrations are of high quality and in large numbers, combining to make this an excellent addition to the preceding series. We feel that the publishers are performing a distinct service and deserve much credit for the publication of these *Clinics.*

MEDICAL CLINICS.

The Medical Clinics of North America. Volume V: Number 2, Mayo Clinic Number, September, 1921; Number 3, Philadelphia Number, November, 1921. Philadelphia and London: W. B. Saunders Company, 1921.

In the September number there are contributions from eighteen members of the staff of the Mayo Clinic. Carman has an unusually long article on primary cancer of the lung that discusses the subject principally from the viewpoint of the röntgenologist. Wilder presents an interesting classification of types of diabetes mellitus. Benedict discusses the retinitis of acute nephritis, Sanford has a brief paper on hypersensitivity to food proteins and Rosenow reaffirms his belief in the elective affinity of the streptococci and shows how that belief is justified. Other contributions are of only little less interest.

Twenty-five of the leading clinics of Philadelphia are represented in the November number. Sailer presents an instructive discussion of a number of instances of mistakes in diagnosis in abdominal conditions. Schamberg and Klauder give some of the results of their experience with Kolmer's new modification of the Wassermann reaction. Jackson shows several conditions in which the use of the bronchoscope was almost essential to diagnosis or treatment. It is impossible to mention all of the contributions but they present under each title some point of interest or value to the physician.

GOUT AND RHEUMATISM.

The Physiology of Gout, Rheumatism, and Arthritis. As a Guide to Accurate Diagnosis and Efficient Treatment. By Percy Wilde, M. D., Physician to the Lansdown Hospital, Bath. New York: William Wood & Co., 1922.

This is a book very much out of the ordinary, in that it is full of novel ideas—or we might say a novel idea, since there is one fundamental theory that underlies all the subjects discussed—and one that starts the reader off on a new train of thought. The author says in his preface that he has no theories regarding gout, rheumatism and arthritis, but that is evidently because he regards his new views as facts, on a plane far above that of theory. He regards disorders of the arthritic class, including neuritis, not as diseases but as physiological observations, the fundamental error being a delayed or insufficient execution of the lactic acid and lactates formed as a result of muscular action or strain. Dr. Wilde has absolutely no use for the uric acid theory, this substance, as found in the various experiments and analyses, being as it was an artefact produced as a result of the various chemical reaction set up by the analyst. The theory (in spite of the author's confidence we must still regard it as a theory) is most interesting and its practical therapeutic application is simplicity itself. As to what this treatment is and how the author seeks to prove his theory we must refer the reader to the book itself; and we can assure him, whether or not he finally accepts the author's theories, he will be interested in the study of his propositions.

PHYSIOLOGY.

A Textbook of Physiology for Medical Students and Physicians. By William H. Howell, Ph. D., M. D., Sc. D., LL. D., Professor of Physiology in the Johns Hopkins University. Eighth Edition, Thoroughly Revised. Philadelphia and London: W. B. Saunders Company, 1922.

The first edition of this standard treatise appeared in 1905 and since then at intervals of two or three years, new and revised editions have appeared. The casual student of physiology is likely to regard physiology as an independent science rather distantly related to practical medicine. Dr. Howell, however, insists that it is an essential basis of medical practice and especially of hygiene. He speaks with scorn, in his preface, of the present day works on personal hygiene which he says are in large part unscientific compilations serving mainly "to perpetuate baseless tradition or to disseminate the vagaries of infantile faddists." A critical scientific presentation of the subject is, he says, much needed. The reviewer agrees with him in the main and hopes that, convinced of the great need of a treatise on hygiene founded on pathology and physiology, Dr. Howell will himself undertake the task of preparing such a work. We would predict for it an even greater need of popular favor than the present volume has enjoyed.

PATHOLOGICAL PHYSIOLOGY.

Pathologische Physiologie. Ein Lehrbuch für Studierende und Aerzte. 1. Abteilung. Die Funktionstörungen des Herzens, der Gefässe und des Blutes. Von Dr. H. E. HERING, o. Professor der Pathologischen Physiologie in Köln a./Rh. Leipzig: Georg Thieme, 1921.

Hering is constructing this new work on the basis of his lectures on the subject and is attempting to inject into it such demonstration of the clinical effect of disturbed physiology as to interest the clinician in the whole subject of pathological physiology. In this first section of the work he considers disturbances in heart action, in vessel action, and in the quantitative and qualitative changes which occur in some of the constituents of the blood. His mode of procedure is to present first the circumstances under which the changes occur and then to picture the results of these changes. It proves to be a very attractive arrangement of the subject and the author's great experience has enabled him to express himself with conciseness and clarity. It promises to be an interesting and valuable work.

DISEASES OF PERIPHERAL NERVES.

Surgical and Mechanical Treatment of Peripheral Nerves. By BYRON STOOKEY, A. M., M. D., Associate in Neurology, Columbia University; Assistant Surgeon, New York Neurological Institute; Assistant Professor of Neurosurgery, New York Post-Graduate Medical School and Hospital. With a Chapter on Nerve Degeneration and Regeneration, by G. CARL HUBER, M. D., Professor of Anatomy and Director of Anatomical Laboratories, University of Michigan. With Two Hundred and Seventeen Illustrations, Eight in Color, and Twenty Charts. Philadelphia and London: W. B. Saunders Company, 1922. Pp. 475.

Seldom is a book of so special a character treated in so broad a way. Most books written on a highly individual surgical topic consider the mechanical situations, while Stookey emphasizes the functional and developmental portions of the nervous system. In addition there are so many ingenious methods detailed that there is little room for adverse criticism of this admirable book. The topic is presented in a pleasing style and the illustrations are all that could be desired.

HYGIENE FOR THE HOUSEWIFE.

Hygiene of Women and Children. By JANET E. LANE-CLAYPON, M. D., Sc. (Lond.), Dean and Lecturer on Hygiene in the Household and Social Science Department, King's College for Women; Justice of the Peace; Formerly Medical Inspector under the Local Government Board. Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton, 1921. Pp. xvii-354.

This book is intended to meet the needs of nurses, health visitors, and other sanitary workers, and particularly to educate the housewife. A book of this kind must necessarily contain much that is trite but the author has endeavored to pass over in a cursory way information which is easily obtainable in order to bring out points not so readily accessible. Though a chapter on sanitary housing is included in the volume, emphasis is laid on individual and personal hygiene, which the writer believes people find most difficult to practice. The major portion of the book is given up to an exposition of up to date ideas on foods and feeding culled from the medical literature. Milk, its composition, production and supply, standards of purity, heating and care in the home, are discussed at length. Tables are given showing the cost and caloric value of various foodstuffs. Chapters are also included on the artificial feeding of infants, rickets and scurvy, and growth and growth factors in infancy and childhood. The print is good, the text is not difficult reading, and the interest is considerably enhanced by seventy-one illustrations.

PSYCHOANALYTICAL SKETCHES.

Disguises of Love. Psychoanalytical Sketches. By W. STEKEL, Neurologist and Psychotherapist, Vienna. Authorized Translation by ROSALIE GABLER. New York: Moffat, Yard & Co., 1922. Pp. vi-171.

The blending of the poet and the scientist is a rare occurrence, yet not unknown. It would be fortunate if Stekel were more of a poet or more of a scientist. He has taken some of the most valuable of Freud's findings and encircled them, even submerged them, with a copious use of words. The use of many words, more or less well chosen, does not make a poet. The advantages of Stekel's position are that the poets may say "As a poet he is not good, perhaps he is a great scientist"; the scientist will say "I know nothing of his value as a poet, but his scientific findings are not sound." The book has many suggestions of value but on the whole there are many works on psychoanalysis which are far more fundamental in character and less misleading.

FAMILY LIFE.

Intrusion. By BEATRICE KEAN SEYMOUR, Author of *Invisible Tides.* New York: Thomas Seltzer, 1922. Pp. 329.

Just to take a single instance of the evershifting satire of life, we have this powerful novel by Beatrice Kean Seymour. A family of intellectuals is pictured—all highly sensitized, refined to an almost neurotic degree. They are natural enough, universal even, especially in their secret admiration of the one frankly unrefined and uninhibited member of the family, the darling reprobate, Jan. Before the actuality of him their world of ideas, resolves and dreams fades. He represents success; they cannot resist him. Even his shade broods over the complicated state of affairs that he leaves behind him, controlling all the characters unconsciously.

Perhaps that is why the conscious realization of the intruder, Roberta, is so difficult for the family. There is the inevitable mismating between her and Jan's writer brother, a poor substitute for Jan; the inevitable struggle on the part of the family to stand by each other and accept Roberta. And there follows also the inevitable and gradual insinuation of Roberta into the private affairs of all the other members of the family. She is disastrous; not because she is common but because she is stupid. Stupid not in the sense of dull or uninteresting—she is anything but that—but in the sense of being totally unattuned to the myriad highly sensitized currents of the life into which she has been projected. The characters, Allan, Roberta's husband, Guen, his writer sister, Carryl, the youthful idealist, and the carefree, daredevil, Jan, are all vivified to a remarkable degree. They act and think and talk like real people and face or shrink from their problems as any one of us might.

Medicoliterary Notes.

Prof. Edward L. Thorndike has in the May number of *Harper's* an interesting article on the *Psychology of Labor.*

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The Connaught Antitoxin Laboratories, of the University of Toronto, have recently published the first volume of a series of studies, which will appear from time to time, embodying the results of investigations of the staff of the laboratories and the department of hygiene and preventive medicine of the university. Among contributors to this volume are J. G. Fitzgerald, D. E. Robertson, A. H. W. Caulfield, D. T. Fraser, P. J. Moloney, L. O. Hanna, R. D. Defries, W. R. Hodge, C. Cohen and G. E. Richards.

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The Eye, Ear, Nose and Throat Monthly is the name of a new journal published in Chicago, the first number of which appeared recently. The editors state that the magazine is primarily for the benefit of "the man in the field." Dr. Thomas G. Atkinson is editor. Among contributors to the number are Dr. John F. Barnhill, Dr. T. F. Dimitry, Dr. Harold Hays, Dr. Robert H. Good, Dr. G. Henry Mundt, Dr. Edward R. Newton, Dr. Oscar Frank Baerens and Dr. L. Herbert Lanier.

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The forty-sixth annual report of the New Jersey Hospital at Morris Plains, for the year ending June 30, 1921, has just been issued. Emphasis is laid upon the immediate necessity of relieving the overcrowded condition of the institution. At the close of the year covered by the report the books showed an increase of fifty-nine patients over the preceding year, the greatest increase for any year since 1914-1915; discharges totalled 324 and deaths 280.

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An interesting experiment is being tried out in the St. Louis schools. After preliminary tests and studies, ozone machines have been installed in the air ducts of several of the school buildings. In most cases the teachers were not told of the change in the ventilating systems so that their mental attitudes could not affect results. The most beneficial effects were noticeable in a few weeks. Teachers volunteered the information that pale and anemic children had gained in weight and that the fatigue of the day's work had been markedly relieved.

* * *

Youth Grows Old, a book of poems by Robert Nathan, published in 1922, follows in spirit his brief novel *Autumn* which came out last year. The central figure of the latter is "Mr. Jeminy," a gentle, lovable, old philosopher schoolmaster in a small New England village. Mr. Nathan's style is his chief asset. Its simplicity, directness and naturalness are a welcome relief and pleasure after the forced striving after effect and sensation that mark so much of our modern writing.

* * *

Modern Men and Mummers, the title of Hasketh Pearson's new book, is descriptive of the contents. The sketch of George Bernard Shaw is the best. The author reminds us in his account of the great eugenist, Sir Francis Galton, that the latter was the real originator of the thory of detecting criminals by their fingerprints and suggested to Bertillon that he should make a practical application of this theory in his work.

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The *American Journal of Public Health* for April contains reports of two interesting symposia held at the fiftieth annual meeting of the American Public Health Association in New York city last November. The subjects were Motion Pictures, and How to Further Progress in Health Education and Publicity.

New Publications Received.

COLLECTED POEMS. By EDWIN ARLINGTON ROBINSON. New York: The MacMillan Company, 1921. Pp. xi-592.

UP STREAM An American Chronicle. By LUDWIG LEWISOHN. New York: Boni & Liveright, 1922. Pp. 248.

THE OTHER MAGIC. A Romance of the Tropics. By E. L. GRANT WATSON. New York: Alfred A. Knopf, 1921. Pp. 275.

PSYCHOANALYSIS IN THE SERVICE OF EDUCATION. By Dr. OSKAR PFISTER. New York: Moffat, Yard & Co., 1922. Pp. x-176.

SPIRITISM AND THE CULT OF THE DEAD IN ANTIQUITY. By LEWIS BAYLES PATON, Ph. D., D. D. New York: The MacMillan Company, 1921. Pp. ix-325.

BASAL METABOLISM: ITS DETERMINATION AND APPLICATION. Edited by FRANK B. SANBORN, M. S. First Edition. Boston: Sanborn Company, 1922. Pp. 282.

SOLUTIONS IN TEN LESSONS. A Manual for Use in Training Schools for Nurses. By ELSIE M. SMITH, R. N. Second Revised Edition. St. Louis: C. V. Mosby Company, 1922. Pp. 59.

DOMICILIARY TREATMENT OF TUBERCULOSIS. By F. RUFENACHT WALTERS, M. D., B. S., M. R. C. P. (Lond.), F. R. C. S. (Eng.). New York: William Wood & Co., 1921. Pp. xii-290.

DIAGNOSTIC, TRAITEMENT ET EXPERTIS DES SEQUELLES OCULO-ORBITAIRES. Par le Dr. F. TERRIEN. Preface par le Pr. A. GILBERT. Avec 67 figures dans le texte. Paris: Librairie J. B. Balliere et Fils, 1921. Pp. 276.

A HALF CENTURY OF PUBLIC HEALTH. Jubilee Historical Volume of the American Public Health Association. Edited by MAZYCK P. RAVENAL, M. D., President. New York: American Public Health Association, 1921. Pp. xi-461.

THE PSYCHOANALYTICAL STUDY OF THE FAMILY. By J. C. FLUGEL, B. A.. The International Psychoanalytical Library, No. 3. London, Vienna, and New York: The International Psychoanalytical Press, 1921. Pp. x-259.

TECHNIQUE DE LA REACTION DE DEVIATION DU COMPLEMENT DE BORDET ET GENGOU. Avec utilisation speciale de la methode de Calmette et Massol. Par P. F. ARMAND-DELILLE and L. NEGRE. Deuxieme edition. Paris: Masson et Cie, 1922. Pp. 194.

THE PRACTICAL MEDICINE SERIES. Volume VII: Skin and Venereal Diseases. Edited by OLIVER S. ORMSBY, M. D. Volume VIII: Nervous and Mental Diseases, Edited by PETER BASSOE, M. D. Series 1921. Chicago: The Year Book Publishers, 1922.

ÜBER TUBERKULOSE IM MITTELSTAND NEBST VORSCHLÄGEN ZU EINER ERWEITERUNG DER BEKÄMPFUNGSMASSNAHMEN. Von Dr. med. CARL BREUL. Mit sechs Uebersichten und einer Epikrise. Tuberkulose-Bibliothek. Beihefte zur Zeitschrift für Tuberkulose, herausgegeben von Prof. Dr. LYDIA RABINOWITSCH. Nr. 6. Leipzig: Verlag von Johann Ambrosius Barth, 1922. Pp. 64.

Practical Therapeutics

THE NEW AND DIRECT METHOD OF TREATING CATARRHAL JAUNDICE.

Comparative Value of the Old and the New Methods Based on a Study of Thirty-one Cases.

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There is a difference of opinion with regard to the value of the new and the old methods of treating acute catarrhal jaundice. The results derived from the study of these cases are presented with the idea of contributing to our information on the subject and with the realization that it will require contributions of others, along the same line, before we may be convinced of the greater efficiency of one or the other method.

By the new method of treatment I refer to the Meltzer-Lyon method of socalled gallbladder drainage in which fifty c. c. of a twenty-five per cent. solution of magnesium sulphate is introduced into the duodenum by means of the duodenal tube, and after which the duodenal contents are drained by siphonage or gently aspirated.

The object of this treatment is to relax the sphincter in the papilla of Vater and thus permit of a freer flow of bile from the gallbladder, owing to a lessening of the obstruction in the region of the ampulla, where, owing to congestion, swelling, edema and increased mucous formation, the bile outlet into the duodenum has been rendered less patulous. The theory of relaxation of the sphincter by this means I believe is not disputed but the same cannot be said with regard to the action of the drug in contracting the gallbladder.

The new method of treatment, then, has to do with duodenal intubation and the application of a drug or drugs to the duodenal mucosa direct. With this is combined the general management which is similar to the old, namely, rest in bed, skimmed milk diet, water freely, the alkalies and bismuth, etc., as indicated.

With the new method an enema may be resorted to every other day for constipation, while in the old method the custom was to administer orally calomel followed by magnesium sulphate. A survey of these cases reveals that there was no hard and fast rule followed, other than the use of these drugs at the outset and occasionally their repetition in a few instances, during the course of the disease.

The cases studied were under observation and treatment at the University Hospital. They will be divided into two groups: Group I representing eighteen patients treated entirely by the old method; Group II consisting of thirteen patients treated by the new.

Group I.—A brief summary of these cases shows that the disease was ushered in by gastrointestinal symptoms in eleven instances, by respiratory or infectious symptoms, such as coryza, cough, fever and chills in five instances, while twice the first manifestation was jaundice. Marked weakness was a prominent symptom in nearly every case.

All were typical, uncomplicated cases of catarrhal jaundice. The pulse was characteristically slow, the fever low in five cases, absent in the rest, at least during their stay in the hospital. Six of the eighteen revealed a leucopenia, with a relative lymphocytosis, and in the majority the blood pressure was subnormal.

The results of the old method of treatment used in this group probably will be best illustrated by the accompanying table.

TABLE I.

Showing Duration of Illness of Eighteen Patients Treated by the Old Method

Case No.	*Name*	*Age Years*	*Number of days ill before admission*	*Number of days in hospital*	*Number of days actually jaundiced.*
1	A. G. B.	23	42	8	**
2	R. F. C.	21	6	5	**
3	L. P. G.	29	16	9	10
4	P. N.	34	21	14	29
5	P. E.*	27	15	17	27
6	W. H. O.	33	8	35	8
7	P. V.	26	9	25	15
8	J. M. E.	20	10	7	13
9	E. H. S.	18	14	8	9
10	T. S. F.	23	8	14	22
11	K. H. L.	24	6	4	8
12	J. H.	16	11	3	**
13	J. J. B.	20	4	9	11
14	E. F.*	30	56	11	46
15	M. M.	20	6	15	15
16	P. L.*	27	11	7	15
17	J. A. S.	29	4	9	13
18	J. B.	47	12	9	**
		Years	*Days*	*Days*	*Days*
Averages		25	14	11	17

*Female.

**Indefinite.

The averages thus revealed two factors. First, the average duration of illness before admission to the hospital, together with the average time spent in the hospital, was twenty-five days or nearly four weeks. Second, where a definite history could be elicited with reference to the actual jaundice, its duration was found to be seventeen days. Cases I, IV, VI and XIV were unusually prolonged. So much for this group of cases treated by the old routine methods.

Group II.—A summary of the group of thirteen cases treated by the new method shows the disease to have been ushered in by gastrointestinal symptoms in five cases, in three of which a definite history of dietary indiscretion was elicited as a probable causative factor. In five other cases the onset was characterized, first, by acute respiratory symptoms and followed shortly by gastrointestinal disturbances. In three cases general malaise and chills ushered in the disease. Weakness was also a frequent complaint in this series of cases. In this group fever was low or absent in most instances. The pulse was slow and blood pressure frequently below normal. Leucopenia was noted in three cases and a relative lymphocytosis in two.

The technic employed was as follows: At 7 a. m. the fasting patient was given the tube, the gastric residuum removed and the tube then permitted to work over into the duodenum. When properly done this, as a rule, can be accomplished within an hour. Any duodenal contents encountered were removed and then from fifty to sixty c. c. of a twenty-five per cent. solution of magnesium sulphate, warmed to body temperature, was introduced and the tube clamped for fifteen minutes. After that the clamp was removed and siphonage of the duodenal contents was permitted until 1 p. m. when the tube was withdrawn and the skim milk diet given.

The following table illustrates the duration of the attacks and the influence of the new method of treatment upon the duration.

TABLE II.

Case No.	Name	Age	Number of days ill before admission	Number of days in hospital	Number of days actually, jaundiced	Number of days required to relieve symptoms and clear jaundice by drainage
1	B. F. M.	22	5	11	7	7
2	S. G.	30	14	26	27	19
3	E. F. T.	20	4	7	8	6
4	G. H. K.	17	7	10	7	4
5	O. L.	21	7	14	12	7
6	M. J.	20	56	11	41	7
7	C. T.	22	9	13	7	6
8	R. R. R.	21	4	7	6	4
9	A. J. A.	29	3	6	14	3
10	Y. S.	25	6	16	11	4
11	K. G. W.	22	3	12	10	9
12	A. C.	25	21	20	10	6
13	G. B. W.	21	7	9	*	5
		Years	*Days*	*Days*	*Days*	*Days*
Averages...		22½	11	12	12	6½

It will be seen from this table that the patients in this group were nearly the same average age as in Group I and that the course of the illness, until the tube treatment was started, ran parallel with regard to duration before admission to and time spent in the hospital. The duration of the jaundice, however, averaged twelve days in this group, against seventeen days in Group I where the old method of treatment was used.

The point, however, which should be emphasized particularly is the fact that an average of only six and a half days of drainage were necessary to clear the jaundice and it may be noted that in each instance after the first or second day of drainage the patients' gastrointestinal symptoms subsided rapidly and the appetite promptly returned. The urine became lighter and the stools darker usually on the third or fourth day.

It may be noted that frequently one and, at times, two or three days of intubation were necessary before a flow of bile could be established. In Case II, for instance, six days were required before bile could be recovered in spite of the fact that the fluoroscopic examinations revealed the tube in the duodenum. This patient was particularly resistant to treatment, and as he was very deeply jaundiced, and in view of the delay in recovering bile, it may be assumed that the congestion, edema, and swelling of the mucous membrane in the region of the ampulla was more than ordinarily severe.

Where prompt response was not derived from the magnesium sulphate solution and the tube was shown to be in position by the fluoroscope, I have found that the administration of calomel in one and a half to two grain doses by mouth, tended to produce quite a free, watery secretion which frequently and rapidly showed bile.

In view of the known action of calomel on the duodenal mucosa and its ability to produce a free watery secretion, it was administered to these patients by mouth whenever the magnesium sulphate action was retarded, and it is my impression that it was of distinct value in hastening results. A year ago I reported a few cases treated in this way, the technic being given in that report (1).

The suggestion may be made that the daily administration of magnesium sulphate by mouth would have the same effect as though it were introduced by the tube. Meltzer has shown experimentally that if the magnesium sulphate is introduced into the stomach of dogs it does not have the same effect as when introduced directly into the duodenum. Further, the daily oral administration of the drug to patients suffering from jaundice and in whom there is usually anorexia, nausea, vomiting and other indications of an acute gastritis, would seem to be both theoretically and practically poor therapeutics. The drug, even in strengths of twenty-five per cent., is a gastric irritant and tends to retard the emptying time of the stomach and for these reasons would seem to be contraindicated orally, at least, as a daily procedure.

CONCLUSION.

1. From this series of cases I feel that the duration of catarrhal jaundice may be considerably shortened by the new and direct method of treatment.
2. The patient is usually relieved of gastrointestinal symptoms within forty-eight hours.
3. If the direct method of treatment is applied at the first appearance of jaundice one may naturally expect a shorter duration than by any other method.
4. The administration of calomel, one and one half to two grains by mouth, is of value as an auxiliary measure in the more obstinate cases.

REFERENCES.

1. Hopkins, A. H.: The Treatment of Catarrhal Jaundice, *Medical Clinics of North America*, March, 1920, p. 1463.

1726 Pine Street.

The Appendix and Diseases of the Adnexa.—H. Thaler (*Wiener klinische Wochenschrift*, April 6, 1922) discusses the importance of differentiating between acute appendicitis and acute or exacerbating salpingitis. Careful examination should elicit, 1, the local symptoms; 2, the associated phenomena, and 3, the history, so as to limit the mistakes in diagnosis; in doubt only is an exploratory laparotomy indicated. The facts that exudate from the appendix may extend into the pelvis and involve the right adnexa and that the appendix may be subcecal (a pelvic organ) limit the value of the local findings in the differential diagnosis. The sign in favor of appendicitis are an early developing and externally palpable resistance in the right hypochondrium, associated with abdominal tension over it and pains radiating toward the stomach. The McBurney, Lanz and Kümmel points of tenderness are not reliable, Rovsing's and Blumberg's signs aid in the diagnosis. Primary adnexal diseases are recognized by an early resistance palpable bimanually deeply in the pelvis at the side of the uterus; a high location of such a resistance diminishes the value of this sign; frequently there is tenderness in the right vaginal vault; Fränkel's sign is valuable only in the early stage. A large adnexal tumor does not disprove the existence of appendicitis. The diagnosis is extremely difficult in the presence of simultaneous acute peritoneal symptoms, as with twisting of the pedicle of an adnexal tumor. If the local symptoms are not clear, the associated symptoms and the history may be of assistance. In appendicitis, the signs of acute peritonitis are found more often. The difference between the axillary and rectal temperature is of value only in deciding between appendicitis and noninflammatory adnexal diseases. Salpingitis is usually associated with gonorrhea or ascending septic infections. Irregular genital hemorrhages may occur. Chronic adnexal inflammation may be difficult or impossible to differentiate if the appendix lies in the pelvis. Severe right sided pains in spite of severe left sided palpable changes are significant. With an abscess in the cul de sac of Douglas, the differential diagnosis is not of much importance, as both require incision and drainage. Both conditions may be present simultaneously and completely, independently of each other (thirty per cent.); both may be caused by a common etiological or conditional factor, such as constitutional anomalies, tuberculosis, or carcinomatous tumors of the appendix (brastoma of the appendix). There may be a direct etiological relationship between diseases of the appendix and of the adnexa, and vice versa, without demonstrable direct contact of these organs. Backward displacements of the uterus may result in this way. Perisalpingitis and perioophoritis may result, with disturbances of ovulation and irregular hemorrhage. Appendicitis is no specially predisposing factor to tubal pregnancy. If both tubal ostia are closed, sterility results. Secondary involvement of the adnexa may cause dysmenorrheic disturbance. True appendicular parametritis and paratyphlitic abscesses in the pelvic connective tissue may develop secondarily to appendicitis, and diseased adnexa may cause adhesions of the appendix, with so-called cysts of the sorosa; metastatic disease of the appendix may be due to secondary contact with the diseased adnexa, usually by lymphatic propagation in the retroserous connective tissue.

Chronic Invagination Complicated by Suppurative Appendicitis.—Emmerich Frommer (*Wiener klinische Wochenschrift,* February 2, 1922) reports a case, hitherto unreported in the literature, in a woman fifty-eight years old, at which age both these conditions are rare, especially their coincidence. Such cases of invagination are not due to inflammation. In the author's case the development of the invagination could have been well imagined, if the tip of the appendix together with its mesentery had not been adherent: it was a case of a beginning total ileocecocolic invagination associated with an inflammatory process of the appendix. The question arises, which of these factors was the primary cause. An invagination may be caused by appendicitis as a result of the inflammatory, infiltrated surroundings, which cause excessive intestinal peristalsis and a resulting invagination on the one hand, and by the fixation of the perityphlitic adhesions on the other hand, which probably occurred in this case. However, it can also be easily imagined that the invagination may be caused by a secum mobile, dragging with it the appendix and strangulating the appendiceal artery, which is an end artery; the resulting venous congestion and infiltration are an excellent nutritive medium for the intestinal bacteria, which then produce the appendicitis and possibly gangrene and perforation.

Serous Meningitis in the Course of Gangrenous Appendicitis. — W. Steiger (*Wiener klinische Wochenschrift,* April 6, 1922) reports a case in which a boy eight years old was admitted to the hospital with the diagnosis of appendicitis and peritonitis. Operation revealed a diffuse peritonitis, originating from a perforated appendix. On the next day the patient had an epileptiform convulsion with complete unconsciousness and other signs of meningeal irritation, which lasted five days. Recovery followed two lumbar punctures, which showed a clear fluid with negative findings. The absence of pronounced focal symptoms, the slight rigidity of the neck and the low temperature pointed to a serous meningitis. The differentiation of this condition from tuberculous or purulent meningitis, pseudomeningitis and hydroencephaloid meningitis in gastrointestinal antointoxication of children is difficult; with an acute beginning, only the subsequent course and, above all, the lumbar puncture make the diagnosis. The prognosis must be guarded and the physician must not despair of treatment because of the apparent hopelessness of the condition. Repeated lumbar punctures constitute the therapy which should never be omitted.

The Double Arch of the Diaphragm in Diaphragmatic Relaxation. — Karl Hitzenberger (*Wiener klinische Wochenschrift,* March 30, 1922) reports a case to show that there is a third explanation for the double arch of the diaphragm as a sign of its relaxation. The explanation that the upper arch corresponds to the upper gastric wall is untenable for physical reasons. The second theory is that certain sections of the diaphragm protrude more than others, giving the staircase picture. The röntgenogram revealed the right half of the diaphragm at the level of the ninth rib with normal excursions during normal quiet respiration, but abnormally great excursions on deep breathing. The dome was at the level of the pulmonary arch of the heart shadow and did not move with respiration; with forced respiration the left diaphragm sank about one cm. together with its dome, but it simultaneously moved as a whole toward the midline, so that the highest point of the dome, at the highest point of respiration, lay more medially and the lateral portions were pushed against the thoracic wall. With Müller's test, the left half of the diaphragm was paradoxically elevated. Faradic stimulation of the right phrenic nerve caused a marked depression of the right diaphragm and stimulation of the left nerve caused a depression two mm. less than on deep respiration. The left half of the diaphragm showed no double arch. On the basis of the history, the röntgenogram and subsequent operation, the diagnosis of subdiaphragmatic relaxation was confirmed. The patient had a gastric ulcer with niche formation and röntgenography during an attack of pain showed most active motion of the left arch of the diaphragm, completely independent of respiration. The left half of the diaphragm sank into itself, followed immediately by the appearance of a new contour, which showed the same fate. At times there were even two, three or four such arches, with significent changes in the gastric gas bubble—alternate shrinking with loss of air and reappearance; the rapidity of these changes varied. A small lateral portion of the diaphragm did not take part in this phenomenon—that part under the gas bubble of the splenic flexure. This phenomenon was not disturbed by quiet respiration. This finding was due to a peristaltic wave of the diaphragm producing the double contour, which was transmitted from the greater curvature of the stomach. This symptom cannot serve in the differential diagnosis between hernia and relaxation of the diaphragm.

Treatment of Cholelithiasis.—Pauchet (*Presse médicale,* November 9, 1921) asserts that cholelithiasis, occurring as a medical condition following angiocholecystitis, should be treated medically—even if previously treated by operation—for a few months or years by means of a proper diet, bile, and mineral oil, which combat constipation and promote the biliary flow that sweeps out the canaliculi in the liver. After operation the vichy cure is even more useful than before, expulsion of stones and their arrest in the bile duct being no longer threatened. Early operation is indicated in view of the fact that surgical intervention for stones in the bile duct is a serious matter while for stones in the gallbladder it is relatively free from risk.

Intussusception of Ileum.—M. H. Biggs (*Surgery, Gynecology and Obstetrics,* November, 1921) concludes that while intussusception is essentially a disease of childhood, it is found in adults with sufficient frequency to make it of surgical importance. Intussusception in childhood is usually spontaneous; in adults a demonstrable lesion can ordinarily be found. The most common cause for intussusception in the small intestine in adults is a benign tumor, which can often be diagnosed before obstruction occurs. Recurrent invagination is often present previous to obstruction. After surgical reduction of intussusception, tumor must be sought for and if present removed to prevent recurrence.

Dilatation of Common Bile Duct.—Reel and Burrell (*Annals of Surgery,* February, 1922) contend that during the past century, with its phenomenal development of abdominal surgery, there has been no apparent increase in the percentage of the occurrence of this condition. The preoperative diagnosis has never been recorded, due no doubt to its rare incidence. The striking clinical feature present in practically each case reported has been intermittent jaundice in the child or young adult usually associated with some form of palpable tumor mass in the upper right quadrant of the abdomen. It would seem that cystic dilatation of the bile passages should be considered in the differential diagnosis when the above mentioned clinical symptoms are encountered. The case serving as a basis for this discussion was a female, aged fifty-six. Her symptoms, however, were noticed at the age of twenty. Since that time her main discomfort had been gastric disturbance, intermittent jaundice, pain, and tumor formation. So far as was possible to determine, this was the oldest patient reported in the literature with this condition. The cyst containing approximately eight litres was in all probability the largest on record. The patient at the time the case was reported was enjoying good health and was able to attend to her household duties.

Cholecystotomy.—A. M. Willis (*Surgery, Gynecology and Obstetrics,* February, 1922) states that cholecystostomy with drainage is a procedure of great value in certain instances, but its use in unsuitable cases leads to frequent disappointment. Likewise, cholecystectomy is an operation of great value in many instances, but the trend toward removal of every gallbladder capable of removal will inevitably result in the sacrifice of many functionally valuable organs, the invalidism of a certain number of patients from injury to the bile ducts, and the premature death of others. The author's advocacy of the ideal operation in some of these cases is not based solely on theoretical considerations. He has already practised this procedure in a limited number of cases and the results obtained have been most gratifying and encourage him in his belief that this operation has a definite field of usefulness in the surgery of the gallbladder.

Ligation of Cystic Duct in Cholecystectomy.—Hartman, Smyth and Wood (*Annals of Surgery,* February, 1922) speaking of the results of high ligation of the cystic duct in cholecystectomy, assert that where a cystic duct stump is left, it usually dilates to form a pseudogallbladder; hence we may get a recurrence of the symptoms after a cholecystectomy. Where the cystic duct is ligated flush with the common duct, there is general dilatation of all ducts, indicating that there is pressure in the biliary system. The gallbladder is not essential to life, but it seems to have a definite function of storing bile and acting as a tension bulb to regulate pressure in the biliary system. Nature endeavors to restore the normal condition in the biliary system, after the removal of the gallbladder by the ducts, including the cystic duct stump undergoing a dilatation and enlarging. It is an indication that Nature rebels against man's attempt to improve on her, hence the gallbladder must have some definite function.

Cholelithiasis.—Norbert Ortner. (*Wiener klinische Wochenschrift,* March 30, 1922) discusses the clinical significance of infective biliary colic with or without gallstones. Gallstones predispose to infections. Infection is the basic cause of biliary colic and not the stone alone. There are aseptic gallstones, the cholesterin stones associated with stasis of the gallbladder from various intrinsic and extrinsic causes, which are latent; these may appear under the guise of an infectious biliary colic from enterogenic or hematogenic bacterial infection. Icterus is a rare phenomenon of gallstone disease, provided the infection and disease are strictly confined to the gallbladder and the icterus is not of septic origin. Chills may occur with or without subsequent fever (reflex, nervous). The characteristic localization of the biliary colic is behind the right costal arch, radiating to the right, backward and upward toward the shoulder. Radiation to the left must be differentiated, as it may be due to stomach cramps (pyloric), pancreatic disease, biliary calculus in the left lobe of the liver, or an associated left nephrolithiasis. A stone may be impacted in the neck or cystic duct of the gallbladder, or in the choledochus. The differential diagnosis between gallbladder and gallstone disease is based on the biliary colic, which may be localized in the gallbladder, in the large extrahepatic ducts, in the liver itself, or it may be extrinsic. Carcinoma, tuberculosis, or gumma of the gallbladder rarely produces repeated attacks of biliary colic. Chronic adhesive pericholecystitis or perihepatitis may cause colic, even with fever and slight icterus. A rare condition is aneurysm of the artery of the gallbladder. Recurrent attacks of biliary colic may be produced by disease of the large extrahepatic bile passages with stenosis or closure of their lumina from intrinsic and extrinsic causes, such as tumors, ulcerations, echinococcus cyst of the liver, enlarged lymph nodes, acute or subacute liver atrophy, and icterus hemolyticus. The latter may produce gallstones. Lues and carcinoma of the liver, multilocular echinococcus cyst, liver abscess and peracute congestion of the liver must also be considered. Neuralgias of the liver (nontabetic) must be looked upon with suspicion, as they are usually due to cholelithiasis. Tuberculous peritonitis may originate in the liver capsule and may resemble biliary colic. The extrahepatic conditions to be differentiated are duodenal ulcer, colic from pyloric stenosis (on the left side), appendicitis, right acute paranephritis, subdiaphragmatic angina pectoris, neuritis of the right phrenic nerve, and malaria.

Preoperative Preparation for Obstructive Jaundice.—U. Walters (*Surgery, Gynecology and Obstetrics*, December, 1921) states that most patients with obstructive jaundice, who die after operation, succumb from intraabdominal hemorrhage. In most cases postoperative hemorrhage occurs when the coagulation time of the venous blood is longer than nine minutes. The coagulation time of the blood can be reduced greatly and the toxicity diminished in patients with obstructive jaundice by daily intravenous injections of five cubic centimetres of a ten per cent. calcium chloride solution for a three day period. Carbohydrates and glucose prevent disintegration of body proteins when the patient is in a state of toxemia. Large quantities of water aid in eliminating toxic bile pigments and increase the body fluids. It is selfevident that in operation for obstructive jaundice the various steps of the operation be carried out with the utmost gentleness, care being taken not to traumatize the tissues, especially of the liver, and for this reason cholecystectomy should not be performed at the primary operation if it can be avoided.

Pressure Points in the Cecal Region and Chronic Inflammation of the Cecum.—V. E. Mertens (*Wiener klinische Wochenschrift*, March 30, 1922) asserts that McBurney's point only indicates the region of the cecum and that Lanz's point indicates the real spot of the origin of the appendix. By actual experiments he was able to show that there was a distance of an average of three and eight tenths cm. (at the most five cm.) between these two points in the adult. Tenderness at McBurney's point, McBurney's and Lanz's points, and the Lanz point alone is found in the proportion of one, three and seven. Absence of tenderness at McBurney's point does not speak against chronic appendicitis. Kümmell's point lies higher, one to two cm. vertically below or somewhat to the right of the umbilicus, and may be present when the other two points are absent; it is frequently found in hysterical patients. Lanz's point is valuable in those cases of chronic inflammation of the cecum which resemble gastric disorders. Pains may radiate in all directions from both McBurney's and Lanz's points, when these points themselves are insensitive. Pressure on Lanz's point may produce pain somewhere else in the abdomen without and connecting radiation. Operation in these cases often reveals slight changes —kinks or thin membranous deposits which inhibit the mobility of the appendix. A tender Lanz's point with radiation of pain is often seen in children who fail to thrive. Appendectomy works wonders in these cases. In children, the McBurney point is more frequently tender, but this may be an error, as both the appendix and cecal points lie higher in children. If the tenderness remains after appendectomy, it is due to adhesions. The radiating pains are explainable anatomically, corresponding as they do to the peritoneal nerve supply. There may be overstimulation or irritable cicatricial inhibition of the nerves.

Pneumococcal Peritonitis.—McCartney and Fraser (*British Journal of Surgery*, April, 1922) conclude that there is an essential division of pneumococcal peritonitis into two classes—primary and secondary. The primary class is peculiar to the female sex, because it is the result of infection of the peritoneal cavity from the genital tract. The primary type, according to the acuteness of the infection, may be subdivided into three different varieties —fulminating, acute, and chronic.. Primary pneumococcal peritonitis begins as a pelvic peritonitis, and in a typical case the clinical features afford strong evidence of the pelvic distribution. The course of the disease shows two distinct stages— introductory and septicemic. The mortality has been greatly diminished by the use of blood transfusion at the commencement of the septicemic stage.

Benign Tumors of Stomach.—Eusterman and Santy (*Surgery, Gynecology and Obstetrics*, January, 1922) conclude that benign tumors of the stomach are rare and constitute only one and three tenths per cent. of all gastric tumors that have come to operation. The actual proportion of benign new growths to malignant new growths or ulcerations is one to two hundred. Myomata and fibromata constitute the largest group, gastric polyposis the most infrequent. About fifty per cent. of benign tumors are found in patients over forty. There is no characteristic syndrome and gastric chemism ranges from achylia to hyperacidity with hypersecretion. The summation of evidence favors the diagnosis of gastric cancer. The majority of the tumors are situated in the region of the pylorus, the greater curvature, anterior and posterior walls. The smaller tumors are practically symptomless unless situated at the orifices or unless multiple. Common complications are recurring hemorrhage, which occurred in thirty-seven per cent., and pyloric obstruction, which occurred in twenty-five per cent. Palpable mass, food retention, or six hour barium retention is less frequent than in gastric cancer. Often patients with benign gastric tumors are refused operation because the condition is regarded as malignant and inoperable. The true nature of the lesion is discovered only when the patients insist on operation. The surgical end results are excellent.

Function of Gallbladder.—Harrer, Hergis, and VanMeter (*Surgery, Gynecology and Obstetrics,* March, 1922) assert that the function of the gallbladder is that of a concentrator of bile, which concentration is effected chiefly by the lymphatics. That the gallbladder is emptied of its contents—if it is emptied at all through the cystic duct—by pressure of adjacent, distended and congested organs during digestion, and by the milking action of the duodenal peristaltic waves, and that the rhythmic contractions of the gallbladder are of no importance in this respect. That by means of the lymphatics infections are carried from the gallbladder to the glands at the head of the pancreas, producing a lymphangitis and lymphadenitis and a lymph stasis which later becomes organized and results in chronic pancreatitis.

Volvulus of the Cecum from False Torsion of the Umbilical Cord.—H. Lehman (*Wiener klinische Wochenschrift,* February 23, 1922) describes a case in which the site of the strangulation was at the perforation of the colon through the mesenteric root. The ileus followed a trauma. Distinct symptoms of intestinal obstruction developed. The operation revealed a cecal clockwork torsion of 360 degrees about a hand's breadth above the Bauhinian valve, causing a complete closure of the gut. A common ileocolic mesentery allowed sufficient mobility for the development of the torsion. The whole colon beyond the site of the torsion was resected and a side to side ileocolostomy was done at the site of the remaining ascending colon and recovery followed. The diagnosis of such cases has always been considered to be impossible, especially in emergencies, but in cases with a long history of intestinal obstructive disturbances, a röntgenogram is of great assistance in making the diagnosis, as it shows an abnormal position of the duodenum and the colon dorsally to the stomach; also great distention of the left portion of the colon, suggesting a retroposition.

Some Human Digestion Experiments with Raw White of Egg.—Mary Swartz Rose and Grace MacLeod (*Journal of Biological Chemistry,* January, 1922) conducted experiments on ten healthy young women, who took daily from ten to twelve whites of eggs as a part of a simple mixed diet. The eggs were first taken cooked in a three day period, and then raw for the same length of time. In one group of experiments the raw egg whites were taken thoroughly beaten; in another they were used in their natural state, and in a third group they were half beaten and half unbeaten. The results of their experiments are as follows: Raw egg whites, in as large amounts as ten to twelve whites daily, are well utilized in the human subject, the average coefficient of digestibility calculated for the raw egg white alone being eighty per cent., compared with eighty-six per cent. for cooked whites in the same diet. The absorption varies with the method of preparation, being less for raw egg whites taken in their natural state than when beaten light. A mixture of whites partly beaten and partly unbeaten gave an intermediate value. The quantities consumed are regarded as maximal in dietary practice, and it seems unnecessary to emphasize the difference between raw and cooked eggs if the raw eggs are beaten.

Ascaridiasis of the Bile Passages.—Arthur Neudörfer (*Wiener klinische Wochenschrift,* February 23, 1922) reports four such cases, which are seen much more frequently since the world war. This condition resembles acute cholangitis most, but is differentiated from it by the severe and continuous pain simultaneous with the attack and the pulse frequency. The patient appears critically ill, with legs drawn up and a purely costal respiration; the temperature is 38° C. to 39° C. and the pulse frequency is 120 or over; the icterus is pronounced. In contrast to acute pancreatitis, acute cholangitis and a perforated gastric ulcer, the upper abdominal wall is soft and not tender; the gallbladder is at first not enlarged and not tender, but on deep pressure to the right of the midline under the left lobe of the liver, pains are felt. It is still a moot question whether the cause of the severe intoxication is the toxin of the ascarides or the acute cholangitis from the penetration of the parasites into the large bile passages.

Megacolon.—Fowler, Davidson, and Mellon (*Surgery, Gynecology and Obstetrics,* May, 1922) in a consideration of congenital megacolon in an adult, concludes that the socalled idiopathic megacolon is relatively infrequent in childhood and rare in the adult. The only congenital feature of megacolon is the redundant sigmoid. The unobstructed redundant sigmoid may be nearly or quite symptomless. The degree of obstruction, from whatever cause, determines the subsequent course. Relatively slight obstruction produces a definite syndrome without dilatation or hypertrophy. Acute obstruction, either primary or superimposed upon hypertrophy, induces sudden dilatation and the desperate picture common to such obstructions. Chronic obstruction causes gradual dilatation and compensatory hypertrophy, the type described by Hirschsprung. Kinking, or valvelike action at the rectosigmoid junction, is the usual cause of obstruction. When the rectum, also, is involved, anal spasm is a likely factor. The surgical treatment of megacolon aims at removal of the crippled bowel and restoration of the intestinal continuity.

Gastric Ulcer.—E. Klein (*Annals of Surgery,* December, 1921) states that gastroenterostomy performed for the cure of gastric ulcer may be followed by, a, hemorrhage, which in half of the cases probably comes from the unhealed ulcer; b, perforation of an unhealed ulcer; c, carcinomatous degeneration of the ulcer; d, persistent or recurrent gastric symptoms, which in some of the cases are due to the unhealed ulcer. Gastric ulcers may develop in the stomach in the presence of a gastroenterostomy. This does not refer to gastrojejunal ulcers. A case is reported where the persistence of gastric symptoms was due to an unhealed prepyloric ulcer following a well performed gastroenterostomy. The symptoms yielded to partial gastrectomy. If at all possible the surgical treatment of peptic ulcer should include the removal or destruction of the ulcer. It is unfair to compare mortality statistics of partial gastrectomy and gastroenterostomy, since the former operation can cure severe cases in which the latter is entirely without effect and might just as well not have been done.

Proceedings of Societies

MEDICAL SOCIETY OF THE STATE OF NEW YORK.

One Hundred and Sixteenth Annual Meeting Held in Albany, April 18, 19 and 20, 1922.

SECTION IN SURGERY.

Dr. George W. Cottis, Jamestown, N. Y., Presiding.

Some Phases of the Surgery of the Spleen.—Dr. Royale H. Fowler, of Brooklyn, said that indications for splenic surgery comprised three groups: 1, injuries, abscesses, cysts, new growths; 2, diseases of the blood forming system, comprising Banti's disease, Gaucher's disease and hemolytic jaundice; surgery in this group was empirical, as the splenic disease was one link of a chain of a diseased system; 3, pernicious anemia, primary cirrhosis of liver with splenomegaly, leucemia and polycythemia vera, the results in the latter diseases being variable. Group I: a. Traumatic rupture with or without other injuries; there were forty-one splenectomies, with fifteen per cent. mortality. b. Spontaneous rupture, usually in hypertrophy. There were five splenectomies without mortality. c. War wounds. These were usually multiple; operation averaged eight hours after injury. Forty splenectomies gave a fifty per cent. mortality. d. Abscess, usually from typhoid fever. Excluding infarction, splenectomy gave a mortality of from twenty-one to twenty-three per cent. e. Cysts: These include, dermoid cysts; nonparasitic cysts, in which malaria, syphilis, and pregnancy were the usual etiological factors; pseudocysts; echinococcus cysts; sarcoma and cavernus angioma have been reported. Group II: Banti's disease, operative mortality in the first stage was twelve per cent, and in the ascitic stage fifty per cent. Gaucher's disease; nineteen cases had been reported as splenectomized, with five deaths. Hemolytic jaundice: The literature quoted ninety-six cases splenectomized, with a mortality of three and one tenth per cent. Group III: Pernicious anemia: The Mayo Clinic reported five cases of four year cure, after splenectomy. Other reports were less hopeful. Splenectomy figures in leucemia showed an alarming mortality. In polycythemia vera the mortality was very high, but some good results had been reported. In cirrhosis of the liver, early operation should give good results. Late operations were fatal.

Dr. J. M. Hitzrot, of New York, said that in some cases operation on the spleen disclosed a small accessory spleen, attached to the larger organ. With excision of the primary spleen the secondary one tended to develop and assume normal proportions.

Dr. Robert T. Morris, of New York, said that the point made by Dr. Hitzrot relating to the growth of a full sized spleen from a small adjuvant spleen, after removal of the larger organ, seemed to him to be very significant. It included the idea that Nature really felt the need for a spleen and a large one. When the ovaries had been removed, some latent rests of ovarian tissue in the broad ligament sometimes developed into actively functioning organs. On the other hand, when the appendix or gallbladder were removed, Nature apparently made no effort to replace them, apparently leaving them in the category of vestigial structures without present day usefulness.

Cholecystitis; Its Relation to Infection of the Liver and Pancreas.—Dr. W. Howard Barber, of New York, said that good clinical histories undoubtedly remained the most valuable means of interpreting gallbladder cases; these supplemented with reliable experimental work added to our knowledge of the liver and pancreas. The gallbladder, liver, pancreas and other healthy organs had been found to harbor bacteria, and the presence of bacteria in the blood stream was not necessarily pathological. Microorganisms were found both in health and in traumatic and anesthetic shock. Fecal tissues were almost free of them. Latent bacteria in the gallbladder walls might become a source of reinfection of other tissues, as they might be carried by the blood and lymphatics, or by contiguity of tissues, to the liver. Portal borne infection was the most common and accounted for the cholecystitis that accompanied appendicitis, duodenal ulcer, splenic disease, and other lesions in the portal field. The organisms, after being strained out by the spleen, were sent to the liver for destruction; this organ encapsulated organisms, such as typhoid and protozoa, surrounding them with connective tissue, as seen in portal cirrhosis. The gallbladder was probably infected by lymphatic extension. With cholecystitis there was coexistent hepatitis, and the infection then passed to the pancreas by way of the regional lymphatics. Pancreatic lesions existed in about twenty-five per cent. of cases of hepatic cirrhosis. Deaver called this disease pancreatic lymphangitis. Infection carried by bile might cause acute pancreatitis. The best treatment for cholecystitis was cholecystectomy, with drainage through the cystic duct preferred.

Pancreatitis.—Dr. Harry R. Trick, of Buffalo, stated that his attention had been called to this condition by two cases occurring near together and not correctly diagnosed. The infrequency of these cases often caused them to be missed, although occasionally a real triumph in diagnosis was secured by their early recognition. At the Buffalo General Hospital, thirteen cases had been seen in the past two years, four of which were correctly diagnosed. The condition was always a serious one. In 1889, Dr. R. H. Fitz brought out a publication based on his thirteen years' work on this disease. He classified the pathology into three types: suppurative, hemorrhagic and gangrenous. This division, though not entirely comprehensive, served to differentiate upper abdominal lesions. The disease was probably caused by an extension of a process from some adjacent organ; the cause might be either chemical, pyogenic, or mechanical (as in trauma). The activation of the gland substance caused destruction by its own secretion. The secretion could be activated by bacteria, so that blood stream infection was possible. Attacks had been known to follow acute infective disease. Autolysis of the gland produced various forms of discoloration, and the typical "beef broth" exudate was given off in large quantities. Gland destruction liberated the fat splitting enzyme, causing fat necrosis, both near and distant. A serious form of the disease was pancreatic apoplexy, in which type the hemorrhage occurred first. The clinical symptoms of the disease were acute, unbearable pain in the epigastrium, vomiting and collapse. A curious yellowish cyanosis appeared on the upper part of the body. The swelling over the gland was deep seated and resistant. The pulse was slow and fairly good until collapse occurred. In profound collapse surgery was useless, as pancreatic apoplexy was indicated. In the less serious forms, simple incision and drainage of gland débris were all that should be attempted until the patient was over the crisis and definite improvement seen. Proper surgical measures could then be instituted.

Some Phases of Gallbladder Surgery.—Dr. William D. Johnson, of Batavia, N. Y., suggested drainage of the gallbladder in the early stages of toxemia of pregnancy. He found this relieved the vomiting. In seven cases in which this operation was applied, he found bile as thick as "jack wax." In all cases the vomiting was stopped in from twelve to twenty-four hours, though one patient died two weeks later of acidosis. No postmortem was obtained. The author thought that toxemia might be due to an incompatibility of fetus and mother, and suggested the typing of blood of parents, and the checking up of cases where incompatibility existed. If the mother belonged to group II and the father to group III, the case could be followed to see if it was from such a union that toxemia occurred. The picture of the liver in cases of pernicious vomiting was like that of acute yellow atrophy, and the centre of the liver lobule was affected by the poison. Reports had shown agglutination of the red blood corpuscles (thrombi), which might be caused by the incompatibility of the blood. The author emphasized features of importance in the surgery of deep jaundice. If it was desired to do cholecystogastrostomy, or cholecystoduodenostomy, anastomoses by suture should be avoided, as oozing from stitch holes might result. The Murphy button could be used to form a button anastomosis; both the gallbladder and the stomach were perforated with the cautery. The pressure of the Murphy button would check hemorrhage. Use of the cautery along the edges of the incision would check oozing. Little help was obtained from the various agents to increase the clotting time of the blood. Transfusion might be of help. The Mayo Clinic used an injection, for three days postoperative, of five c. c. of ten per cent. solution of calcium chloride intravenously. To drain the gallbladder, the speaker used the Murphy button, with the drainage tube attached to one part, the other part in the gallbladder, and clamping the two parts together. Clamping the tube controlled the outflow.

Operation for Subcostalgia.—Dr. Marshall Clinton, of Buffalo, said that the papers presented by Dr. Barber, Dr. Johnson and Dr. Trick were most instructive and helpful. There was one point in the diagnosis of the diseases under consideration to which he wished to call attention. They were all familiar with the patient who complained of pain in the epigastric, appendix, or kidney region; the patient, for example, whose gastric reflexes did not measure up to the type expected with lesions in these structures; whose pain came on when he was up and doing and was absent when lying quiet in bed. They were also familiar with the feeling of disappointment experienced when one of these patients returned complaining of a recurrence of pain soon after apparent recovery from an operation for appendicitis, gallbladder or kidney disease. An important clinical entity that had been overlooked very generally had been found and would be reported for the first time.

Dr. James A. Sullivan, of Buffalo, in an unpublished paper had described this interesting condition under the name of subcostalgia. The symptoms of this condition were pain in the region of the appendix, epigastrium or kidney. The diagnosis was made by pressure over the subcostal nerve at the tip of the twelfth rib, by pain produced by tipping the body sidewise and forward, and by observing under the screen the tip of the twelfth rib riding on to the ilium.

The pathological report of Dr. Roman, pathologist to the Buffalo General Hospital, was as follows: "The epineural tissue appears increased, especially in the immediate vicinity of the nerve bundles and comparatively poor in fat cells. In some places the perineurium seems slightly thickened and mostly shrunken, its internal part being continuous in many nerve bundles, with a rather thick layer of delicate endoneural connective tissue which partly or completely encircles the nerve bundles. The latter shows thickening of the connective tissue (sheath of Heule) around many individual fibres, and in places a decided increase of the endoneural nuclei can be seen. The number of fibres, on cross section, seems diminished, especially in such places where considerable areas are obliterated by patches of hyaline connective tissue. In the epineurium the small bloodvessels appear thickened and rather numerous, showing very little or no perivascular cellular infiltrate."

To cure these patients resect an inch and a half of the twelfth rib with two inches of the subcostal nerve. The cure of a patient with this condition is most gratifying and one removes by its successful application another group from the list of socalled neurasthenics.

The Causation of Symptoms in Cases Simulating Appendicitis.—Dr. Howard L. Prince, of Rochester, N. Y., said that there was considerable pathology of chronic appendicitis outside of the appendix. The oratorical period of acute appendicitis, which was, roughly, in full flower from 1900-10, had hardly been forgotten. The public was alarmed, and the prominence given to the disease obscured other conditions in the abdomen. Then prominent leaders came out and announced the dire evils of chronic appendicitis, with its train of attendant manifestations, such as disease of the intestines, kidneys, gallbladder, pelvis, and other organs, while at the same time it was stated that the removal of the offending organ was a perfectly harmless procedure. Then the operative dam broke, and the flood came! Continued experience, however, with the results of operations for chronic appendicitis, had not been accompanied by a solution of its problems. There was, on the one hand, a public cognizant of the dangers of appendicitis, and the profession alert to detect the possibility of a chronic appendicitis underlying any abdominal symptom complex. The result was easy to discern. Any person who complained of abdominal symptoms was, on short order, minus an appendix.

As to afterresults: the pathologist reported "normal appendix" in from ten to fifty per cent. of cases, and the followup work revealed "unrelieved appendix" in from fourteen to fifty per cent. of results. Some of these patients were about the same, some were worse, some were labelled "neurasthenics." Inquiry showed that a large majority of people who complained of appendicitis, underwent other treatment, such as perinorrhaphy, fixation of kidney, removal of gallbladder, and various other abdominal repairs.

When we came to inquire into end results, we found that it was to the patients who had not reported that surgeons ascribed their best work. The profession must look facts squarely in the face. To what could be ascribed the cause of these well known symptoms—headache, backache, nausea, dragging sensation on the right side of the abdomen, pain, constipation, mental disturbance, anorexia—if not to chronic appendicitis? What were the real appendiceal symptoms? One point could be emphasized: The appendix to cause symptoms must suffer obstruction to its lumen, or must have inflammation. The result of its obstruction as a viscus was a colicky pain, about or above the umbilicus, generally with nausea; with inflammation there was tenderness over the appendix. These were two constant findings. The possibility of appendicitis was suggested only by pain and tenderness in the right lower quadrant; it might or might not be so. The colicky midline pain was the first consideration. A good barium examination was a great aid to diagnosis, as a confirmatory measure. When supposed appendicitis caused urinary symptoms, look for the trouble in the urinary tract. Indigestion, flatulence, etc., might be due to bad habits or poor posture, to organic or to mental pathology. A careful neuropsychiatric examination would help to cover this ground. Surgeons had formed the habit of considering the appendix the safest bet and playing it against the field, but this attitude ignored the twenty to fifty per cent. of failures and the thousands of observations in what the profession was pleased to call the "science of surgery." The situation could only be changed by facing facts and taking just blame for mistakes that had been and were being made.

Dr. W. D. Johnson, of Batavia, said that Dr. Prince's paper was based on facts. Often the rule was to say "normal appendix" and then wait to see what happened. The abdomen should be opened in the midline so as not to miss any condition, and the appendix looked at last. A chart should be put on the wall to remind surgeons of things they were constantly forgetting. That was one benefit of medical meetings, to remind one of things frequently forgotten.

Dr. Johnson, of Albany, said he had a long history of chronic appendicitis. The appendix was removed, but later the symptoms returned and he was found to be suffering from duodenal ulcer. How could one have arrived at that diagnosis?

Dr. Jamison, of Poughkeepsie, said many cases of gastric crises of tabes had been diagnosed as chronic appendicitis and operation performed. He never did an appendectomy *per se* but explored the whole abdomen. Often duodenal ulcers cleared up after removal of the appendix. If the case were approached with a judicial mind and every possibility considered there would be fewer bad results after appendicitis operations.

Dr. Prince, in closing said that good surgery must be done where it belonged and the surgeon must be willing to sell the same stuff to his patients that he would take himself. Surgeons ought to be able to arrive at living pathology and not have to go to the dead house for it. The achievements of surgery and the enthusiasm of surgeons were undoubted facts, but surgeons must inquire into results with the same enthusiasm with which they operated, and then they would begin to lower the terrible percentage of failures.

Intestinal Obstruction Following Unrecognized Cases of Appendicitis.—Dr. Arthur M. Dickenson, of Albany, N. Y., said that surgery of the viscera was better known than that of obstruction. Mortality in intestinal obstruction had not greatly decreased, because delay and later diagnosis brought patients to the surgeon too late. In the first twelve hours the mortality was only five per cent., but this rose to twelve per cent. after twelve hours and thirty-one per cent. after twenty-four hours. When paralytic ileus was excluded, the other factors included volvulus, intussusception, bands, kinks, gallstones, malignancy, and adhesions. Symptomatology included vomiting, which was first gastric, then duodenal, then fecal; the pain was cramplike and intensified by catharsis. An important diagnostic sign was the patient's inability to pass flatus. The higher the obstruction, the less the distention, but the more dangerous the case. Dr. Dickenson felt that delay in operation often resulted in later operations being performed on moribund patients. He would rather see a few exploratory laparotomies uselessly done, if more lives could be saved in locating this condition early. He recalled the case of a young man, who for four years had suffered from attacks of appendicitis symptoms, with left sided pain, which had been diagnosed bladder trouble. The site of the pain here was probably due to pull of the omentum or referred pain from subdiaphragmatic pressure from the distended jejunum. The patient was not brought to the hospital till in a state of shock, and he died in two hours. Postmortem examination disclosed a ruptured appendix bound down with adhesions, distention of the small intestine, and a walled off abscess behind the rectum and bladder. This case emphasized the necessity of early diagnosis.

Dr. Edgar A. Vanderveer, of Albany, said the question of diagnosis was of more interest than that of operation. The finding of an abdomen full of adhesions was due to unrecognized appendicitis, though not so extreme as in Dr. Dickenson's case.

Dr. Vanderveer believed that surgeons got the cases earlier nowadays, especially gallbladder and appendix lesions. He summed up by saying, "When in doubt, go for the appendix."

Dr. WILLIAM L. WALLACE, of Syracuse, said that the x ray would show the enormous coils of distended intestine, with absence of gas distention at the site of the abscess. Rectal examination helped in all doubtful cases. In obstruction with collections of pus, the abscess could be opened through the rectum.

Dr. JAMES E. SADLIER, of Poughkeepsie, said that intestinal obstruction was one of the saddest chapters in operative history. The mortality continued high. Had any man in the room a mortality of less than twenty-five per cent.? Yet it should be easy to make the diagnosis. Dr. Sadlier took exception to Dr. Wallace's statement that the x ray was necessary. Careful history and careful physical examination ought to make the diagnosis. He thought Dr. Dickenson should have read his paper before the medical section instead of the surgical. The medical men insisted on giving catharsis and watching the patient and the time passed when it was possible to save the patient's life.

Dr. T. L. DEAVOR, of Syracuse, said that the more we refined methods of diagnosis, the further we got away from the real condition. Instead of using laboratory facilities and the x ray, one should operate at once for an acute abdominal, surgical condition and save the patient. Dr. Wallace said he would like to correct a misapprehension. He did not give barium enemata. One could see the coils of distended intestine filled with gas, by means of the bedside unit, in about a minute. Dr. Dickenson, in closing, said that the question was simply one for or against operation. A certain train of symptoms was recognized which necessitated exploratory operation.

Should Gastroenterostomy Be Performed in Presence of Ruptured Duodenal or Gastric Ulcer?—Dr. DONALD GUTHRIE, of Sayre, Pa., said that on account of the conflicting reports as to mortality and morbidity of this operation, he sent out a questionnaire to 150 leading surgeons comprising the following questions: 1. Do you do gastroenterostomy? 2. What are your postoperative results; do you have to reoperate later? 3. If you do gastroenterostomy, what is the mortality? 4. Do you employ drainage; how long do you leave it in?

To the first question there were four classes of replies: twenty-two men do gastroenterostomy as a routine; sixty-four men do not perform it; thirty-four men gave a qualified affirmative; twenty-nine men gave a qualified negative. The last two groups were conservative in tone. To the second question fifty-seven reported that it was not necessary to reoperate; fifty said it was necessary to reoperate. To the third question various mortality rates were given—from nothing to sixty per cent., some believing that gastroenterostomy increased the mortality. To the fourth question 137 answers were received, of which 101 used drainage; twenty-three men mentioned suprapubic drainage. Drainage periods were stated to be from twelve hours to twelve days. Deaver stated that he did gastroenterostomy but added it should only be done by skilled surgeons. The difficulty with this condition was that few men would admit they were not skilled. The Mayos considered gastroenterostomy simply an emergency operation. Their postmortem studies showed ten cases in which gastroenterostomy would have failed in saving the patient. Most surgeons stated that it was unwise to do gastroenterostomy at the same time as the closure, but that it might be done later, thus giving a chance for two safe operations instead of one risky one.

Dr. W. D. JOHNSON, of Batavia, said in regard to drainage, that early cases had chemical peritonitis and later cases bacteriological peritonitis, so that after twelve hours drainage was needed. Morrison's pouch was a safe place to drain. A soft tube could be pushed down over the brim of the pelvis and the patient turned over on his right side to obtain postural drainage.

Dr. JAMISON, of Poughkeepsie, said the old chronic ulcer with scar tissue would call for gastroenterostomy, if perforated. The embolic type, in which the patient suddenly collapsed, needed only simple closure. The procedures would vary for gastric and for duodenal perforation. There was no routine measure, but judgment must be used to save the patient. The ascending colon acted as a temporary dam to shut off irritating fluid. In old calloused ulcers, after closing the perforation, one could get a clean outfit and do gastroenterostomy in a clean area. The patient showed signs of improvement as soon as tension in the stomach got relief.

Dr. EUGENE POOL, of New York, found no difference in the patients operated on within six hours, in regard to gastroenterostomy or no gastroenterostomy. In early cases good results were obtained, and in late cases there was a high mortality whatever was done. The series was followed for seven years and it was found that in ten out of fifty-seven there was barium retention and second operation was needed. In three cases this was refused; in seven the patients were reoperated upon and did well. The other cases needed no second operation. Thus it would seem that two thirds of the patients would never need it, and to subject them to unnecessary gastroenterostomy was useless, since those who would need it could be operated on at some later date for retention. As to drainage, early cases did not need drainage of the peritoneal cavity. All cases should be drained to the peritoneum because of the irritant action of the extravasated gastric fluid, which caused superficial wounds to break down.

Dr. DEAVOR said he was opposed to gastroenterostomy and often did without closure, simply using an omental graft. He preferred suprapubic drainage to no drainage, and had obtained useful results from a suction apparatus.

Dr. Guthrie, in closing, said that his paper dealt with duodenal, and not with gastric perforations. One often observed Nature's work in closing with omentum. It was hard to tear away. In regard to the type of operation, he personally would refuse to let anyone do a Finney on him except Finney himself. If he were yelling with pain he would want the ulcer closed as quickly as possible and get it over. He could not bring himself to do gastroenterostomy as a routine practice at the time of closure.

(*To be concluded.*)

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Miscellany.

Chronic Bacillary Dysentery and Colitis Gravis.—D. Kling (*Wiener klinische Wochenschrift*, March 16 and 23, 1922) draws the conclusion that all those factors which cause any form of colitis may also cause a colitis gravis on the exhaustion of the healing tendency following constitutional or accessory factors. Among the curative factors, the most important is diet, which should consist of nonirritating, nonresidual, but yet nutritious food of wide selection; it should have the proper consistency and it should be finely divided and well chewed. Specific therapy has proved unsatisfactory. Symptomatically, opium, belladonna suppositories and morphine were used for cramps and tenesmus; papaverin and atropine are useless in moderate doses. Light baths of half hour duration relieve pain and intestinal unrest. The hemorrhages remained unaffected by the usual antihemorrhagic remedies. The administration of tannin and bismuth preparations are of little use and less valuable than local applications of astringent and disinfecting remedies in the form of inoperistaltic irrigations, enemas through an operative intestinal fistula, or as powder treatment (Zweig). Every irritation of the intestine must be avoided and a sufficient, mechanical cleansing and chemical effect must be obtained. Dermatol enemas were used and the irrigation through the fistula were given with physiological saline solution; if no reaction resulted, thinner solutions of ichthyol, tannin and silver nitrate were used, and later their strength was increased if no reaction set in. The results were unsatisfactory; only six out of eighteen patients were discharged markedly improved clinically and rectoscopically. As the internal therapy was ineffectual, surgery was tried; the irrigation fistula or an artificial anus. The former provides more extensive cleansing and the latter also puts the intestine at rest. Enteroanastomosis has proved valueless. The application of an irrigating fistula is a slight operation, its closure is rapid, the treatment can be continued in the ambulatory patient, who is disturbed but little by it. The artificial anus has a high postoperative mortality, its closure is complicated and sometimes impossible, the fecal soiling is troublesome, the patient is confined to the hospital and the result is not as satisfactory as that from an irrigating fistula. The latter is used almost exclusively of late. Operative interference does not radically remove the seat of the trouble in colitis gravis, but only serves as an adjunct to internal therapy, provided it is instituted as early as possible. Total colectomy should be done only if the patient has sufficient resistance and in the severest cases. Only the application of an irrigating fistula should be attempted and it should be kept open as long as possible to avoid recurrence.

Mixed Bacteriophages.—Oskar Bail and Tai Watanabe (*Wiener klinische Wochenschrift*, February 23, 1922) on close examination of the Shiga-bacteriophage "Lauda," which consists of a partial bacteriophage, found both large and small and also very small holes in the agar plate, showing that the natural bacteriophage as derived from human stools, as far as the effect is concerned, is not due to a uniform microorganism; not only is there a third partial bacteriophage in Lauda, as shown by medium large holes in the Shiga plate, but other stool bacteriophages may consist of a mixture of individual bacteriophages, which also differ among themselves. This is important in deciding the question of specificity of the bacteriophage action on various bacteria, as of dysentery and typhoid fever. The methods of isolating partial bacteriophages all depend upon the fact that in the simultaneous inoculation of agar plates with bacteriophages and bacteria, holes arise which on dilution appear distinct and can be inoculated into broth on contact with the platinum needle; the associated bacteria then supply the nourishment for the first increase of the bacteriophages. On repeated inoculation with broth inoculated with Shiga bacilli, these partial bacteriophages can be cultivated indefinitely, but their pure culture is difficult to obtain, as it is very difficult to determine whether the large holes do not also contain smaller holes. It was conclusively shown that there is a combined effect of the partial bacteriophages, different from that of the individual bacteriophages. The independence of the small from the other bacteriophages was also demonstrated serologically, where the large and medium bacteriophages show a close relationship; however, the relationship between large and small bacteriophages may change. The specificity of effect and that of reproduction must be differentiated: there are bacteriophages which act powerfully on various bacteria, as the Shiga and colon bacilli, which can be cultivated indefinitely only with the former, and there are also those that can be fed with other bacteria and act upon both; frequently this is accompanied by a change in the size of the holes. The same bacteriophage may show large holes predominantly on the Shiga plate and small holes on the Flexner plate.

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Modern Commentaries on Hippocrates

Dislocations and Fractures

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There has been occasion several times in the course of the essays contributed to this journal, as well as elsewhere (1) more pointedly dwelt upon, to draw attention to an affection of the throat and neck mentioned in several places in the books, both genuine and those supposed to be the work of another author, of the Hippocratic Corpus, whose pathology involved a supposed dislocation of a cervical vertebra, the vertebra dentata. "Those who draw their breath, whose voice is extinguished, whose vertebra is sunken, have toward the end breathing like a man who gasps" (2). "In the course of a fever, when the neck becomes suddenly distorted and the patient can hardly swallow and there is no tumefaction, it is fatal" (3). In this last we can scarcely fail to see the mind of the observer fixed on the mistaken pathological conception. His clinical observation is warped by the theory of cervical anatomy and pathology which dwells in his mind. Perhaps we would not be warranted in drawing the inference of the existence of this mistake as a widely entertained medical idea in the Hippocratic epoch if we had to depend on the testimony of the *Prorrhetics,* the *Coan Prenotions,* the II Epidemics alone, as by most critics there are not supposed to be the work of Hippocrates II, but in the *Articulations* (4), one of the few books all critics, so far as I know, ascribe to the Master, it is also referred to. Remarkable as it may seem modern paleographers as late as Littré and Adams entertained the same error and discussed throat affections from that point of view.

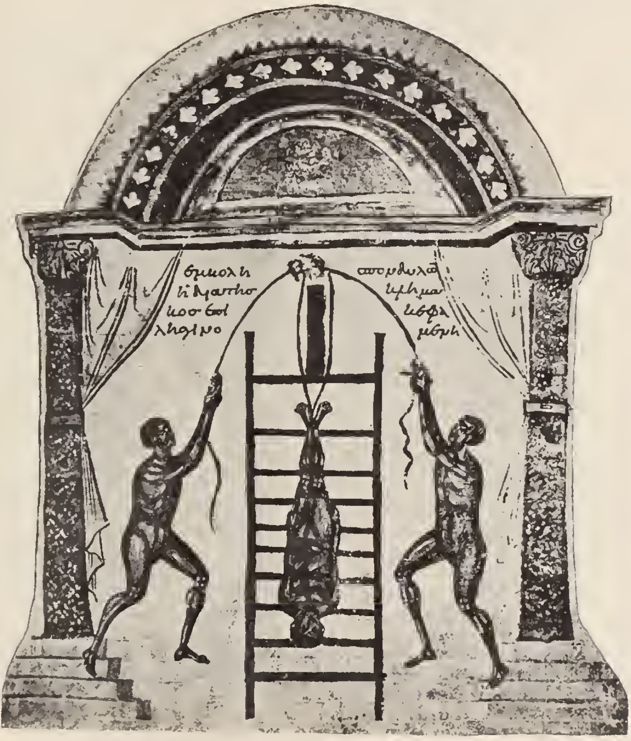

FIG. 1.—Treatment for a dislocated vertebra. (From Apollonius of Citium's commentary on Hippocrates.)

In reading the *Articulations* of Hippocrates the modern student is struck by what seems to him the disproportionate space given in the treatise to dislocations or deviations of the spinal column. This, too, in a treatise which, on the whole, deals most fully of any of them with one single field of surgery, as it is divided today. Adams declared (5) that up to his time (1796-1861) Hippocrates in the *Articulations* had given a fuller and more complete history of everything relating to dislocations, especially of the hip joint, than was to be found in any other work and he insists that no systematic writer on surgery has given so comprehensive a view of the subject of dislocations in all its bearings. If his work on dislocations of the hip and on club foot was of value to the surgery of two or three generations ago, his treatment of spinal affections, if not very

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instructive for the modern orthopedist, is still interesting and it attracted the attention of his earliest commentators, among whom was Apollonius of Citium or Kiton. There are a large number of Apollonii in the annals of ancient medicine. Celsus mentions (6) two and in Smith's *Dictionary* there is a list of twenty-two of them. This Apollonius, however, was supposed to have lived in the time of Cicero and we have three books of his commentaries on the *Articulations* of Hippocrates. The illustrations given here (Figs. 1, 2, 3 and 4), derived originally from an old manuscript, we may well suspect we owe at least chiefly to the inspiration of some copyist later than the time of Cicero. The archeologist, we may conjecture, would hardly regard the background architecture of the drawings to be as early as that. However that may be, it is important to note in Hippocrates that he looks with disfavor on anything so spectacular, so vigorous and on the whole so inefficient as this reproduction would indicate. Indeed he specifically condemns some such procedure.

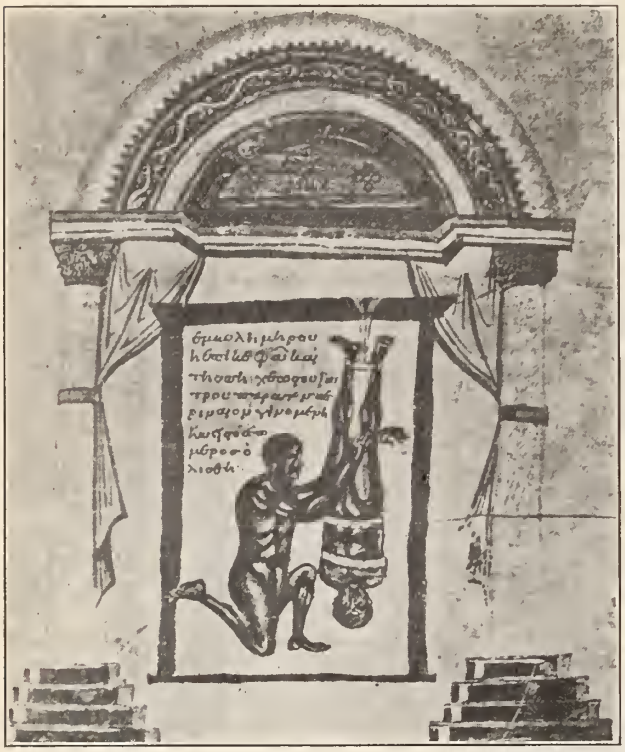


Fig. 2.—Treatment for a dislocated thigh bone. (From Apollonius of Citium's commentary on Hippocrates.)

Apropos of his ethical distaste for anything so liable to excite the wonder and admiration of the gaping crowd of spectators we can imagine gathering at the foot of the step of this portal, too gorgeous for Cicero's day, to the immense profit of the orthopedists bank account, we find him in the *Articulations* (47) speaking of his failures, as in more than one place of the genuine works we take note of the same candor: "I have intentionally written the foregoing for it is a valuable acquisition to know what attempts have succeeded and what have failed." Indeed is there anything in the whole domain of medicine more valuable than this? There is only one thing more important than this. It is the possession of that humility of soul the Master so constantly exhibits in the face of truth, of truth so scantily revealed to us all. This humble earnestness, no more ready to show us his triumphs than his mortifications, is in contrast to the spirit of Galen, commenting on one such passage in Hippocrates: "Why bother about that, the man died." The jibe of Asclepiades, that Hippocrates's therapeutics was a contemplation of death falls flat on us, so jaded are we with the sappy, disgusting, discouraging addiction of men exclusively to their cheerful yesterdays. Of such may be the kingdom of heaven, but Hippocrates knew this world is different. We have in the genuine books his successes and failures without the glimmer of a thought of himself. Let us remember this when we read of the epidemic of paralysis in Thasos and the frequency with which the odontoid was out of place in sore throat. Without this candor medical history is a child's nursery tale, but with it for the medical man it is indeed a priceless acquisition.

The dislocation of the odontoid process and the general tendency toward an exaggerated view of the frequency of spinal deformity were errors doubtless due in part to the great variation in the normal curvatures of the spine. Indeed we find he appreciates the fact (46) that it is rare that "one or more of the vertebræ torn from their articulations experience much of a displacement," but it is clear that he regards minor displacements as not infrequent and perhaps in this category he placed the supposed dislocations of the odontoid. He is even very severe on the osteopaths of his day who are always finding vertebræ to replace and it may well have been more of a fad in his day even than in our own.

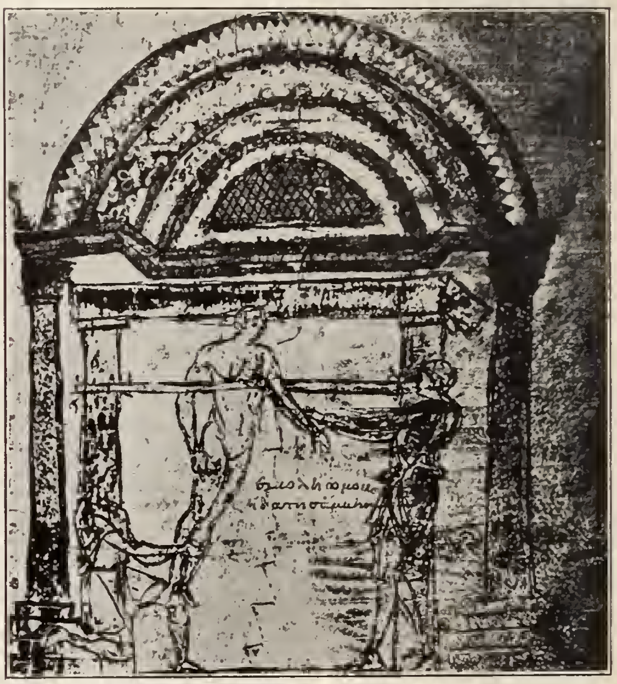


Fig. 3.—The replacement of a dislocated shoulder. (From Apollonius of Citium's commentary on Hippocrates.)

As to some extent shown in Fig. 1 the reduction of dislocations of the hip comprised the hanging of the man head downwards between supports. Pressure of the operator's arm on the perineum and the manipulation of the free hand were used to force the head of the femur into the acetabulum. A less ostentatious procedure and a more efficient apparatus, in Hippocrates's opinion, seems to have been a frame some nine feet long in which the patient lay, provided with winches and pulleys and levers for extension and counterextension. Some of these devices, as they appealed to the imagination of the translator and his expert advisers, are reproduced here from Littré's fourth volume, Figs. 5, 6 and 7. Fig. 8 shows another way of using the ladder in hip dislocations. These and other forms of apparatus or something like them were employed by Hippocrates, but he admits the efficacy often of much less formidable devices and less complex procedures.

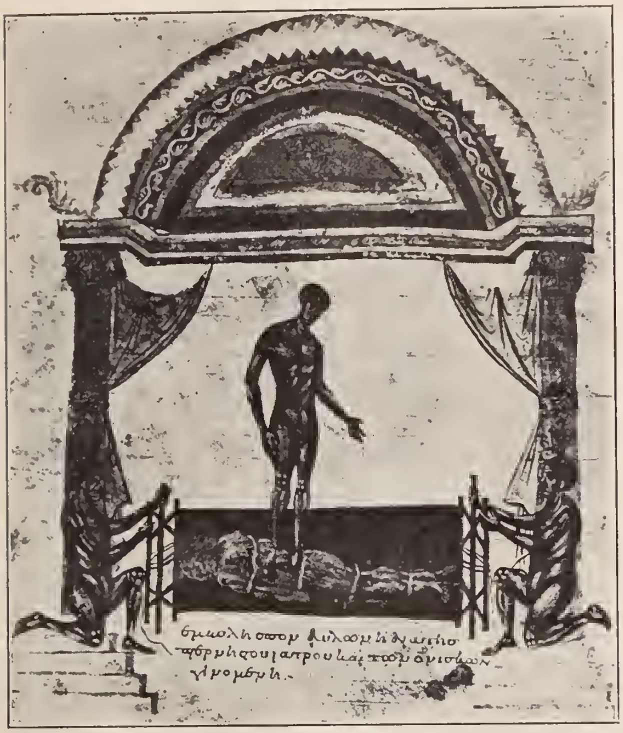


Fig. 4.—Treading the back for dislocated vertebra, at the same time that the backbone is stretched by extending the movable bed. (From Apollonius of Citium's commentary on Hippocrates.)

It is in *Articulations* (1) we get a hint that perhaps Galen was right when he said the Æsculapians practiced dissections in their youthful apprenticeships and knew anatomy so much as a matter of course that they seldom mentioned it in their writings; that it was transmitted by word of mouth and not by books as a rule; but we are privileged to make the largest sort of allowance for this, which after all could hardly have been more than an inference from such passages as the one just referred and a very few others. "If the tip of the shoulder is stripped of the flesh, where the muscle is spread out, if the tendon which belongs to the axilla, the clavicle and the chest, is removed, the head of the humerus will appear," plainly projecting forwards (2) in forward dislocation. In speaking of the difficulties of reducing old dislocations of the shoulder (7) he ascribes the cause in some cases to "the invasion of the articular cavity by flesh." It would be quite captious and regardless of testimony of the most direct kind to deny that at least occasional postmortem examinations were made by the ancient Greeks. If we have no ground to believe their knowledge of anatomy was great or that dissection of the dead body was a frequent practice, it is quite impossible to maintain an attitude of total skepticism on the subject.

With this in mind, after reading the *Articulations* one is astonished in reading the *Fractures* and indeed in reading the paragraphs of the *Articulations* devoted to compound dislocations, to see surgeons in the time of Hippocrates so helpless in the face of the latter and compound fractures. So helpless were they that the best treatment they knew was to bandage the protruding bone in the wound and leave it to take care of itself. Many very primitive modern people in remote savage tribes, apparently uninstructed in the surgery of civilization, do not hesitate to perform amputation in such conditions, or in others in which it is indicated, but this seems to have been a surgical procedure unknown to Hippocrates.

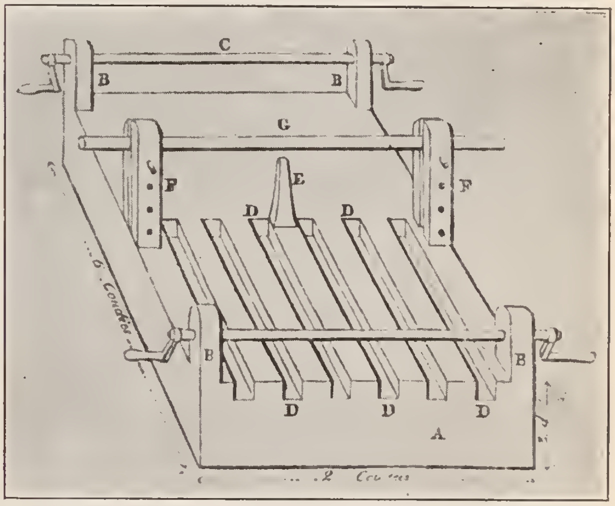
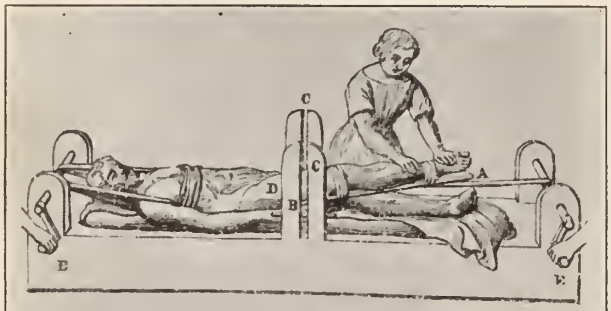


Fig. 5.—Detailed diagram of traction apparatus used in the application of extension.

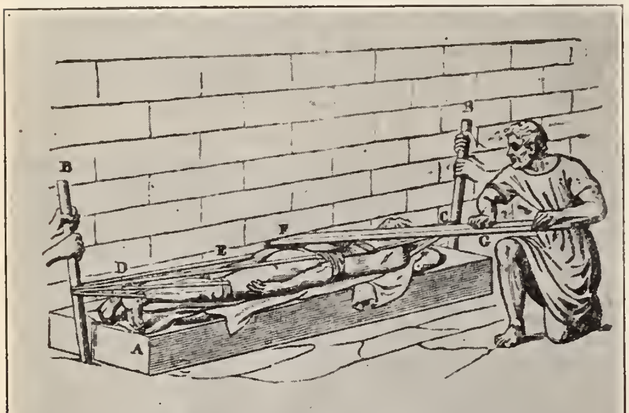
The reason for this decidedly striking gap in the evolution of this branch of the surgical art, besides the embarrassment of hemorrhage, is entirely conjectural. Possibly under the conditions obtaining in Greek civilization pyemia and tetanus, "spasms" he constantly alludes to, were much more frequent than under the conditions in which much more primitive men live, less subject to the dangers of crowded habitations and the much used soil of cities and the also primitive state of hygienic science. In one passage of *Articulations* (68) a favorable prognosis is given of the accidental severing of the fingers or the hand, but in the next section (69) for gangrene it is recommended to amputate through the dead parts so the patient should feel no pain, as this may bring on fainting and cause sudden death. His counsel tends toward allowing the gangrenous part to separate spontaneously, when one is confronted with the compound dislocations of the larger joints. As to the ends of the bones projecting "let another physician reduce them if he will," though "the patient will die if the parts are left thus reduced," from convulsions or gangrene and it is to be inferred the results are scarcely better from leaving them alone.



A Planchette suffisamment longue mise sous le membre luxé.
B Traverse en bois placée entre les supports.
CC Supports.
D Membre luxé étendu sur la planchette et passé par dessus la traverse.
EE Extension et contre-extension.

FIG. 6.—Diagram and directions for the application of extension and counterextension.

I cannot but feel that this anomalous state of surgical practice where so much was done by bloodless surgery, rests fundamentally on a very great but a very natural error which appeared early in the statutes of states rising into civilization. On the stele of Hammurabi, in the old Egyptian codes, in the Zend Avesta, he who took the knife in hand to save the life of a fellow being lost his own in case of failure, if it was a high born man, or if the patient lost his eye so did the operator. An eye for an eye and a tooth for a tooth reached out over the boundary of savage life and was crystallized in the laws of the primitive state whose primary object was to throw safeguards around the lives of its citizens. Where this social codification had not reached a recorded form, less protection was attempted for the members of the tribe and where no such inevitability as the arm of the law represented is in prospect the primitive surgeon still takes his chances. We see therefore how a lack of discrimination in legislation may have impeded the use of the knife.



A Madrier sur lequel se pratiquent l'extension et la contre-extension.
BB Bois en forme de pilon avec lesquels on pratique l'extension et la contre-extension.
C Liens passés autour de la poitrine et sous les aisselles, et attachés au pilon.
D Liens passés au-dessus des genoux et des talons, et attachés au pilon.
E Liens passés autour des lombes et attachés au pilon.
F Entaille pratiquée dans la muraille, un peu au-dessous du niveau de l'échine; un des bouts de la planche y est engagé.
G Planche avec laquelle on exerce la compression sur le lieu de la luxation.

FIG. 7.—Diagrammatic plan with explanatory text showing ways and means of applying extension and counterextension.

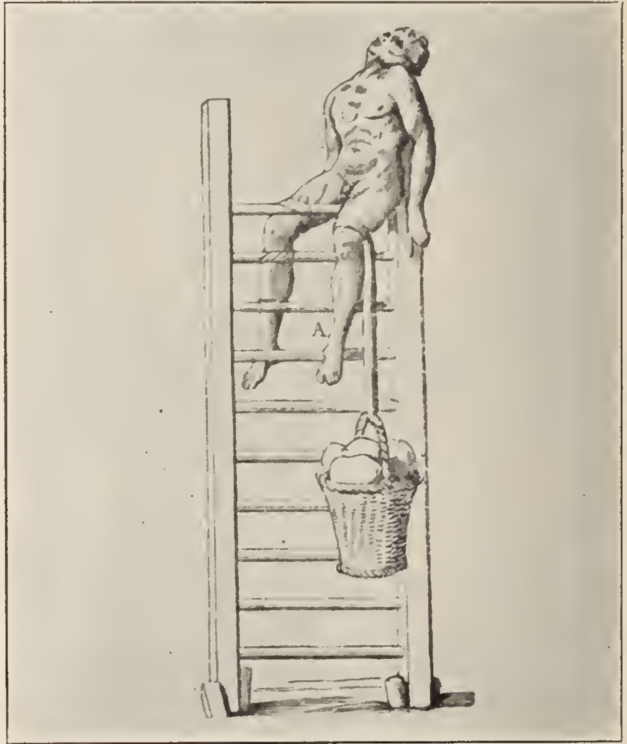


FIG. 8.—Apparatus for extension of the lower extremity. This extension is effected by the attachment to the limb of a basket filled with stones.

The innocent shedding of blood in many tribes was no excuse for the death even of a brother. Herodotus tells many such a tale taken from the traditions of a race far beyond the beginning point of social organization. In many tribes, however, this blood feud arising from innocent blood shedding does not exist, but I fancy that Hippocratic surgical practice lay under some such ban or perhaps only under the social sentiment which gave rise to such impediments in the legislation of earlier civilizations.

REFERENCES.

1. *The Laryngoscope*, May, 1919.
2. *Œuvres complètes d'Hippocrate*, tr. par E. Littré, vol. v, p. 533, *Prorrhetique livre* I, No. 87; vol v, p. 641, *Prenotions Coaques*, 2, 14, 261.
3. *Idem:* Vol. iv, p. 515, *Aphorismes*, iv, 35.
4. *Idem:* Vol. iv, p. 179, *Articulations*, 41.
5. *The Genuine Works of Hippocrates*, translated from the Greek by Francis Adams, LL. D.
6. *A Cornelii Celsi de medicina libri octo*, ed. Daremberg, lib. vii, praefat.

The Tongue as a Source of Systemic Infection*

By THOMAS R. FRENCH, M.D.,
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During the inquisitive wanderings of the tonsil lamp about the lymphoid coverings of the laryngopharynx a year or so ago, our attention was attracted to the base of the tongue by the color signs in transillumination indicating the presence within the tissues of harbored material which is known to be capable of giving rise to systemic infection. As a more searching scrutiny but confirmed our growing belief that the tissues in question were of a similar character to those of the branches of the faucial tonsils, we were led by the seeming promise of further helpful revelations into a more or less careful study of the whole of the dorsum of the tongue.

The first glimpses of a new field of study or endeavor are, of necessity, caught somewhat out of focus and, therefore, a report of our early impressions of a rather inaccessible but seemingly rich field of infection must be regarded as of a preliminary nature. We also wish it to be understood at the outset that though we have made diligent efforts to penetrate some of the mysteries of the lymphoid tissues covering the base of the tongue, this study has, nevertheless, been made almost entirely from a clinical and not from a minute anatomical or morbid histological standpoint.

The subject of this communication is an old, old form over which we have but endeavored to drape a modernly shaped robe. Indeed, the especial features of it to which attention is particularly directed are perhaps the only ones which justify the presentation of this report—that the lymphoid structures on the base of the tongue, which in a general way are described in practically every textbook of anatomy and of diseases of the nose and throat, and also the white coating on the oral dorsum of the tongue, are common and at times prolific sources of systemic disorders produced by infection.

The aggregation of structural masses of lymphoid tissue on the base of the tongue should properly be spoken of as the lingual tonsil, for that body has been described as occasionally extending outward as far as the inferior poles of the faucial tonsils. It is our belief, however, that such an extension occurs in every case in which those tissues are developed beyond the normal state, and as the lingual tonsil is generally understood to mean a concrete, definitely outlined lymphoid body occupying the center of the base of the tongue, we will employ the term *lingual lymphoid apron* in referring to that area, because we do not doubt that, for at least this presentation, it will convey the clearest impression of the broad expanse of diseased tissues to be discussed in this paper.

The straight, cleancut inner wall of an enucleated lingual branch of a faucial tonsil gave us the first clue to the existence of a juxtaposed layer of lymphoid tissue of only a little less thickness than the branch. Applying this knowledge to a series of studies with a tonsil lamp, of a size which would sink deeply into soft tissues, it was quickly revealed that in every one of the large number of adult subjects examined there was a layer of developed lymphoid tissue extending entirely across the base of the tongue between the borders formed by the lingual branches of the faucial tonsils. The thickness of this layer as measured by the tonsil lamp, and afterward verified by dissection, was found to vary in itself and in different subjects from about a sixteenth to a quarter of an inch or more. The cleared mysteries of a former tonsilloscopic study which disclosed the branches of the faucial tonsils and their numerous rentention crypts, aided greatly in the exploitation of this, to us, new field, for the deduction seemed logical that as this tissue was manifestly lymphoid in character and gave the same tonsilloscopic color signs as those which accurately indicate the presence of filled retention crypts in the tonsil branches, the same reason for their production must necessarily exist in both. The reasoning proved to be correct, for the application of the means which were used in disclosing the crypts in the branches of the faucial tonsils, that is, a concentrated beam from a powerful lamp, a large warmed magnifying lens and a searcher, soon disclosed the presence of small mouths of crypts on the surface of this wide lymphoid field. The proof, however, that they were openings of retention crypts was quickly forthcoming by the observed expulsion of exudate while pressure was being made with a curette close to the cryptic openings.

GENERAL ANATOMY.

When this area is viewed directly by deep depression of the tongue or indirectly in the laryngeal mirror, it appears in shape somewhat like a shield covering all that part of the tongue which, when the organ is at rest in the floor of the mouth, is out of the line of direct vision. The use of the ordinary tongue spatula will, as a rule, disclose only its upper margin but a much better view of it can be obtained by drawing out the tongue. On closer inspection the surface of this lymphoid field suggests the appearance of an undulated plot of rough grass surrounded below and at the sides by a raised coping, the coping being the lingual branches of the faucial tonsils.

When viewed from behind (Fig. 1) the whole of this flat mass may be likened to a bat or butterfly with outstretched wings; that is, there is a narrow central section lying between two longitudinal creases, and outer or winglike sections mounding up from the creases on either side. In the lower part of the central section is very frequently seen a concrete, more or less definitely outlined mass of the same character of tissue, which is the structure commonly spoken of as the lingual tonsil. As we now know that the lingual branches of the faucial tonsils are set into the outer edges of the lingual lymphoid apron as a piece is set into a picture puzzle, it is a fair inference that a similar sharply defined relationship will be found to exist between the central mass, which is usually regarded as the lingual tonsil, and the lateral areas or wings of the lymphoid apron. When the whole of the lingual blanket is thin and but little developed its surface presents a smooth appearance but when it is well developed the lymphoid mass is thrown into heavy folds with contact creases between them which are capable of entrapping and retaining the secretions of the throat.

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*Read by title before the Forty-fourth Congress of the American Laryngological Association, Washington, May 2, 1922.

CRYPTS.

The crypts of the lymphoid apron are quite numerous. Some of their openings are slits leading to pocketlike cavities with opposing walls. Even the tops of the circumvallate papillæ contain such pocket crypts. Many minute crypts open upon the floors of the creases. A great many more of the superficially placed crypts are found in the border structure than elsewhere and some of them run under the surface like wall pockets. While many of the crypts are capable of retaining small quantities of the material which finds an exit through them, the amount so retained must certainly occasion far less mischief than the accumulation of exudate which is caught and more or less permanently retained by the contact creases in the apron and also by the entrapping papillæ on the dorsum of the tongue—which presently will be considered.

A network of superficially placed veins, in size somewhat corresponding to the degree of the lymphoid hypertrophy, is spread over the entire lingual blanket and when the lymphoid tissue is fully developed the veins are more than likely to become the seat of varicosities.

WHITE COATING OF THE TONGUE.

On the top of that portion of the tongue which, when the mouth is open can be seen directly, are hundreds of small conical papillæ, each having a vasculonervous core, extending in lines parallel with the circumvallate papillæ from just in front of the circumvallæ to the edges and apex of the tongue. Back of those rows or lines and between them and the circumvallæ, is a diamondshaped area of irregularly placed conical papillæ, of relatively large size, springing from a deeply folded surface, full of creases and sunken spaces, which makes it an especially commodious reservoir for retained secretions from the throat. And immediately back of the circumvallæ there is on each side a narrow field of the same variety of irregularly placed and relatively large sized conical papillæ. According to Harrison Allen's *Human Anatomy,* (1) all of the conical papillæ are covered with hairlike extensions of epithelial cells; hence the name often given them of *filiform* papillæ. This cactuslike formation of the papillæ readily explains the presence on the surface of the top of the tongue of an apparently permanent layer of cheesy mould representing what is known as the white coating of the tongue, for the filiform extensions of the papillæ make the entire surface a veritable tanglefoot for the necrotic material worked up from the lymphoid apron, or which is deposited from other sources in the throat. This material is entrapped and enmeshed in the tangling filiform extensions and forms upon the top of each of the papillæ as a hood or cap of cheesy mould. These hoods of foreign material become so closely incorporated with the tissues of the papillæ that they resist the friction of the passage of fluids and food and cannot be dislodged with a probe or even the edge of a blunt instrument. Indeed, they cannot be dislodged at all but must be shaved off as wax is shaved from the end of a candle. The top of the tongue is covered with a thousand of these small hoods, arranged in lines like strings of miniature pearls, which collectively form a thin layer of cheesy mould overspreading the entire surface. This thin layer constitutes the white coating, or fur, of the tongue, and we now know that this coating is always of a pathogenic nature

So, we see that the lingual apron contains crypts and is a wellspring of exuding necrotic tissue. We also see that it provides many creases of varying depths which act as retention cavities, and we see still further that the surface of the top of the tongue provides traps for the entanglement and retention of the escaped contents of crypts as well as the ingesta of food in the mouth. The tongue is, therefore, seen to secrete necrotic material from the crypts of its apron, to afford reservoirs for the accumulated exudate in the creases of the apron and about the circumvallate papillæ, and also to afford storehouses for the same material on the tops of the numerous filiform papillæ.

While the "fur" on the tongue is not enclosed in crypts but lies spread out upon the surface, the bacteria, or their poisons, contained in it are apparently as capable of finding their way to remote parts to produce infection as those within its feeder—the lymphoid apron. It must, however, be said, that the pathogenic bacteria in the necrotic material on and in the tongue are as a rule fewer in number than those found in the foreign material recovered from the deep recesses of the faucial tonsils, but the question of relative pathogenicity has yet to be determined.

It has long been the custom to regard the white coating of the tongue as a diagnostic sign of certain digestive disorders or as pertaining to general states of the health. That it is an effect of indigestion seems to have been repeatedly disproved by the relief of many symptoms of indigestion through the removal of the coating and the exudate from the apron. A white coating on the tongue would, therefore, seem to indicate the presence in that locality of a cause and not an affect of at least chronic systemic diseases, and even though our observations have been limited to a hundred and twenty cases we, nevertheless, believe it to be safe teaching to say that except in febrile states a uniformly white furred tongue may be regarded as a reliable indication of the existence of a diseased condition of the lingual lymphoid apron, and that the extent and density of the fur is a fairly accurate indicator of the extent of disease in the lymphoid tissue on the base of the tongue.

When a broad field of lingual exudate has been long exposed to the air, it occasionally undergoes putrefactive changes and gives rise to an offensive breath. Of course this is not the only area in which cryptic secretions become putrid and give offense but we have repeatedly been able to prove that the source may be entirely confined to this particular region by cleaning the tongue exclusively with the result of extinguishing the odor.

CHARACTER OF EXUDATE AND BACTERIA.

The exudate recovered from the crypts and retention pockets of the apron and also that which is shaved from the surface of the dorsum of the tongue, is almost invariably of a cheesy character. Occasionally it appears much like mucopus with flocculæ of cheesy matter floating in it, but in almost every case it has either the appearance of pus, thin cream, fresh white paint, half melted ice cream or cream cheese. We have removed such material from the crypts of the apron and the surface of the oral dorsum of the tongue, in about a hundred and twenty subjects, varying in age from eight to eighty years. Most of them were patients in our private practice who had sought relief from symptoms which were believed to be due to infection. Some of them, however, were devoid of symptoms but placed themselves at our disposal solely for the purpose of supplying data for a scientific test. Characteristic necrotic material was recovered from the apron and the top of the tongue in every one of the subjects and each collection yielded a pathogene on culture. The Staphylococcus pyogenes aureus or albus was present in every culture and the hemolytic streptococcus, the Streptococcus viridans or the pneumococcus in about twenty per cent. of the cases. In a number of the cultures bacilli of Vincent's angina also were present. These facts were obtained from a group of subjects which was not selective and they must, therefore, be regarded as at least significant of the extent to which this infective condition has been found to prevail among members of the human family.

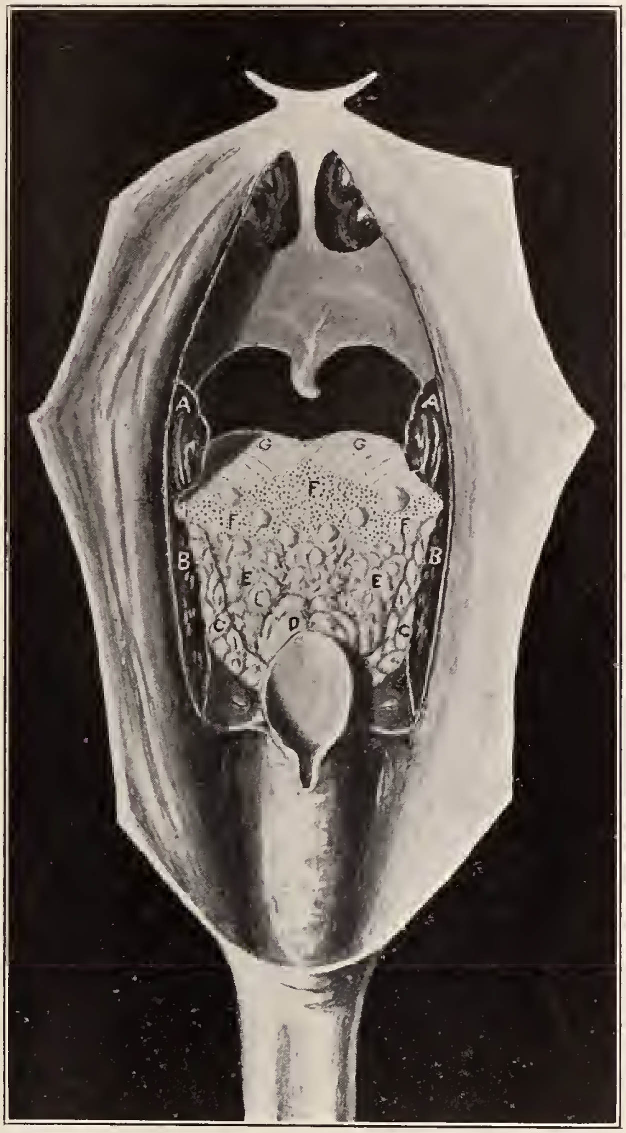

Fig. 1.—Diagrammatic drawing of the pharynx as it would appear if laid open and viewed from the back of the neck. A.A., faucial tonsils; B.B., pharyngeal branches of the faucial tonsils; C.C., lingual branches of the faucial tonsils; D., lingual tonsil; E.E., blanket of lymphoid tissue which together with the lingual tonsil and the lingual branches of the faucial tonsils constitute the lymphoid apron on the base of the tongue; F.F.F., dotted area showing irregularly placed large filiform papillæ in front of and behind the circumvallate papillæ; G.G., filiform papillæ in oblique lines on the oral dorsum of the tongue; F.F.F. and G.G., show the areas of the white coating of the tongue.

POSSIBLE REMOVAL OF LINGUAL BRANCHES.

A study of enucleated lingual branches of the faucial tonsils shows that they are provided with well developed underlying capsules and also that these border structures are set up against the edges of the apron as sharply as tiles are set against other tiles in cement. This knowledge affords excellent reasons for believing that the whole of the apron has beneath it a limiting membrane or capsule which would make possible its complete removal from the tongue and so permanently dispose of its numerous collections of baneful bacteria. Unless, however, accidental stripping of this structure from the tongue should demonstrate the feasibility of dispensing with such a protective layer and that subsequent dryness would not occasion perpetual distress to the patient, as we fancy it would, we doubt if a radical disposal of the whole of that wide lymphoid blanket should at present be seriously considered. We are not yet in a position to express an opinion of the effect in dryness of the enucleation of the lingual branches of the faucial tonsils which form the border of the apron, but we believe it highly probable that as those structures are the greatest offenders by containing the largest number of crypts, we will soon be able to feel our way to a decision in this important matter.

CURETTAGE.

Very happily, however, the conservative method of curettage is admirably adapted to the removal of the contents of the crypts and pockets in this situation, as well as to the removal of the white coating of the tongue. As the lymphoid apron is a broad veneer of yielding tissue of practically uniform thickness, lying flat upon the muscular structure of the base of the tongue, it lends itself far better to exploitation, evacuation and surface cleaning by curettage than do any of the other lymphoid or other tissues in the pharynx. Though the ordinary curettes failed to meet the need, the sideway sweeps of their shanks soon revealed the paths which must be followed to secure the release of the trapped detritus. The way being pointed out we applied the edge of a bent sharp submucous resection elevator, pressed it firmly into the soft lymphoid blanket and drew it obliquely upward, with the pleasing result of rolling the necrotic material up upon the flat of the blade as snow is rolled up upon the board of a snow scraper. The *lingual plane,* which was evolved from the sharp elevator and is now being used, (Fig. 2) differs from the early models in that the inner flat surfaces are laid back at angles of 30° and 40°, the end is curved at a slightly acute angle and the shank is bent to fit over the tongue.

To this instrument every lingual apron to which it has been applied has quickly yielded varying quantities of necrotic material, and not uncommonly when the accumulated results of the shavings of the dorsum of the tongue are added, the quantity in a seance amounts to a cubic centimeter or more. Following the movements of the plane in the image of the lingual field reflected in the laryngeal mirror, gives by far the best results. Without the mirror the nodular eminences alone are scraped and perhaps injured and the creases in which much of the broken down material lies are left untouched.

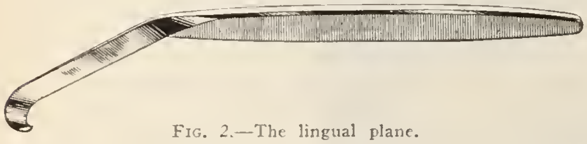

FIG. 2.—The lingual plane.

As both hands of the operator are fully occupied in the procedure about to be described, the tongue must meanwhile be held out by the patient. Then, after a surface application of a four per cent. solution of cocaine to the apron only, followed by the irrigation of the whole length of the tongue with a fifty per cent. solution of alcohol, the plane is passed down over the left side of the mound of the tongue and while its edge is being pressed firmly into the border of the apron it is swept for a half inch or so toward the opposite side of the throat. The instrument is then drawn forward and out of the mouth gathering on its way the material which was expressed and dislodged from the section it had covered The collections adhere to the plane until scraped off over the edge of a tongue spatula. The remainder of the apron should then be curetted by repetitions of the movements just described until it is felt that the whole of the lingual blanket has been covered. Around the median rhaphe, for an inch or so in front of the lines of the circumvallæ, the filiform papillæ are larger and are covered with hoods of foreign matter which are so much thicker than those upon the neighboring papillæ, that they coalesce to make a broad and almost solid patch of cheesy mould which, in especially large quantities, can readily be removed from the soggy surface. While the patient continues to hold out the tongue, the lingual plane should next and finally be swept over the oral dorsum of the tongue from the anterior edge of the apron forward toward the tip, by a series of sweeps which perhaps can best be compared to the action of a dull drawplane in removing bark from a seasoned log, or of a lawn mower over a level plot of grass, except, of course, that the plane does not actually cut the living tissues. As in addition to the cheesy hoods of the papillæ the shaving plane must in this region gather up a considerable quantity of buccal secretions overlying the coating of fur, it is often most convenient to hold the side of a spoon against the dorsum of the tongue, near its tip, to act as a runway depository for the copious collections.

While a dull plane will remove much of the necrotic material from the apron, and is the safest to use in that area, it will have but little effect upon the coating of the tongue. A plane which is too sharp will injure the tissues and excite reactions. A plane which, however, is just sharp enough will shave the hoods of mould, together with their filiform traps, from the tops of the papillæ without injuring the tissues. This, however, can only be accomplished by repeatedly drawing the plane over the surface of the tongue as a carpenter's plane is drawn over the surface of a board. If an attempt is made to carry out this procedure thoroughly in one seance, a reaction of myositic pain in various parts of the body is very apt to follow and continue for a day or two. It is, therefore, best to proceed slowly but, nevertheless, to persist in ridding the surface of the dorsum of the tongue of its original pathogenic coating, for it is now manifest that the original coating down to the tops of the papillæ must, as nearly as possible, be removed in order to permanently eliminate a source of infection from the tongue. It is somewhat difficult to shave the hoods from the papillæ just back of the circumvallæ without injuring those larger and firmer structures and, therefore, the effort should always be made with the aid of the mirror Patients rarely experience even the slightest local discomfort after the proper employment of the lingual plane.

Before and after curettage, and between the seances at home, the use of alcohol in from forty per cent. to fifty per cent. solutions as a mouth wash will assist in cleansing the surfaces and in destroying the bacterial content of the cheesy mantle lying in or upon the dorsum of the whole length of the tongue.

REACTIONS.

There could, perhaps, be no more direct and easily demonstrated evidence of the pathogenicity of the exudate which is found in and upon the tongue and of its capability of exciting toxic systemic disturbances, than the reactions which very commonly occur almost immediately after the performance of lingual curettage. While such reactions have been most pronounced after the removal of large amounts of detritus from the tongues of subjects, whose cultures showed the presence of great numbers of the most virulent forms of microorganisms, they also have occurred, at times with most unpleasant emphasis, in subjects whole cultures grew only a few of the weaker forms of pathogenic bacteria.

The character of the reaction which usually occurs in subjects suffering from myositis is an increase of pain for a few hours, or even days, which is usually confined to or is most pronounced in or about the seat of the disturbance for which relief is sought. The pain of reaction may, however, extend into other parts or even occur in various other localities. In arthritic subjects the commonest form of reaction has been a general sense of discomfort and uneasiness for a day or two or an increase of pain in the affected part. In the subjects of gastrointestinal disorders the reaction has most often taken the form of nausea, or even vomiting, but occasionally there has been a brief attack of diarrhea with cramps. In subjects without symptoms, who had submitted to the treatment to assist in the scientific test, myositic pains occasionally occurred after the removal of the coating of the tongue only, but in the large majority of every kind of cases, even after the removal of great quantities of necrotic material from the whole of the tongue at one time, reactions either have not occurred at all or have taken the form of slight malaise in the night and on the day following a seance of curettage.

While it may not be possible to prevent entirely the occurrence of reactions after curettage, they, nevertheless, can be ameliorated or avoided by taking pains to prevent injury to the epithelial layer through guidance of the movements of the plane in the mirror, or, by removing a smaller quantity of detritus, especially in the early seances, or, by making the interval between the seances at least a week, or even ten days, or by all of those measures combined. The testimony of a number of intelligent and observant individuals in whom severe reactions had occurred was to the effect that the severity of the symptoms of their reactions progressively declined, and in some cases disappeared, during the course of the treatment.

DECLINE OF VIRULENCE OF MICROORGANISMS.

This opens the way to record an expression of belief born of a long experience with curettage of all of the lymphoid structures of the pharynx, excepting the pharyngeal tonsil, that the original necrotic tissue which may have occupied the trapped surface of the oral dorsum of the tongue or which has been sheltered within the crypts, pockets and creases of the lymphoid apron for a long period of time, is empowered with greater virulence than that which is reproduced after the removal of such original material. Necrotic tissue will invariably be reproduced if the entrapping filiform extensions of the papillæ on the dorsum and the crypts and creases of the apron remain intact, but, apparently, for a time at least, though from other sources we have known it to be for years, its infective power is weakened or abolished, or the body is immune to it.

Since we have been made aware of the potentialities lurking in the contents of the tonsillar branches and the lymphoid apron, as well as in the layer of pathogenic exudate lying upon the top of the tongue, we have had numerous opportunities to try out the effects of curettage of all those structures in adult subjects from whom the faucial tonsils had been removed, and the often marked improvement in or abolition of persisting symptoms secured in that way have clearly shown that to relieve human suffering produced by infection from the throat, we must be prepared to deal with a much larger field than that comprised within the faucial tonsils only.

INFECTIONS.

The diseased tongue seems mainly to be an expansion of the oral and pharyngeal fields which act as sources of systemic infection, and while our experiences have shown very plainly and positively that it holds an especially intimate causal relationship with disorders of the digestive tract, we have been able, in addition, to demonstrate clearly it to be a contributive factor in, or the sole reason for the occurrence of, myositis, rheumatism, arthritis, vasomotor rhinitis, inflammatory new growths, reflex cough, enlarged thyroid glands, pendulous folds under the chin, some of the simpler skin diseases, low and high blood pressure and arrhythmia.

An instructive demonstration of the effects of the removal of the necrotic contents of the lingual apron and the layer of coating of the tongue upon chronic rheumatism, was given in the case of a physician who had suffered for eighteen months with severely painful and crippling rheumatism of the back. Every known means of relief had been contributed by many of his confrères without success before he was referred by an orthopedic surgeon for curettage of the tongue. The pain began to yield after the eighth or ninth seance, each one of the curettage procedures having been followed by progressively decreasing reactions of pain in the affected region, and now the patient, who is desirous of having this report published, says that he is only rarely reminded that he has a back. The predominating organism in this case was the Staphylococcus aureus in large numbers.

The list of disorders given above must serve only as a suggestive pointer, for we have been too much occupied in an effort to determine the infectivity of the necrotic tissue taken from diseased tongues to attempt to apply the test to the relief of any other maladies than those which fell incidentally under our observation and care during the course of this investigation.

During the period in which the relation of this field to various systemic conditions was being tried out, practically every patient whose lymphoid apron had been largely cleared of its diseased contents and whose tongue coating had been repeatedly shaved off, expressed their consciousness of a refreshment in their general health; that their appetite was better; that there had been an increase in weight, if before the treatment it had been below normal, or that they had more vigor and endurance and could accomplish more than usual—and their appearance bore testimony to the truth of their assertions.

Evidences of immediate improvement rarely follow curettage of the apron and the white coating of the tongue. It seems to be necessary in almost every case to remove by repeated scrapings of the entire tongue most of the original exudate before improvements begin to be recognized. If then the results are not shown in any special way, they are quite certain to appear in the form of improvements in general health. And our belief is that such improvements in health are almost always and almost entirely due to improvements in the digestive function. Indeed, so much of impressive evidence has been presented of pronounced amelioration in or complete disappearance of various and often distressing symptoms of chronic indigestion during or after the course of treatment by curettage, that there is now no room left for doubt that a very intimate causal relationship through infection exists between the diseased tongue and the gastrointestinal tract. In other words, this area apparently holds the key to many of the still unsolved mysteries concealed within chronic disorders of the alimentary canal.

In commenting upon the association of gastrointestinal disturbances with lingual tonsil hypertrophy, Wright and Smith (2) record a keen observation which in the light of recent revelations seems singularly like a prophecy. They write: "Chronic dyspepsia of the nervous type is observed in a considerable number of patients. Constipation is another condition which is apt to be associated with lingual hypertrophy. Whether the close relationship in anatomy and function with the gastrointestinal tract has any influence in the association of acid dyspepsia and constipation and lingual tonsil symptoms we do not presume to say, but we call attention to the suggestiveness of the coincidence."

That the necrotic tissue in and on the tongue is at times the sole cause of chronic constipation by infection, has been conclusively demonstrated in a number of cases during this investigation. The following is a graphic illustrative case:

CASE.—M. C., female, aged twenty-four, whose tonsils were well enucleated five years ago, had suffered severely and continuously from constipation since she was twelve years of age. No apparent result followed six or eight seances of curettage of the lingual apron except a rather sharp reaction in the form of diarrhea, but almost immediately after the surface of the dorsum of the tongue in front of the apron had been included in the curettage procedure, three months ago, the bowels began to move without artificial assistance. After two or three subsequent shavings of the white coating of the tongue, the movements, for the first time in half the years of her life, became quite normal, and daily natural evacuations have continued up to the time of this writing. Meanwhile her appetite has quickened and twenty-two pounds have been added to her weight. Incidentally it may be of interest to note that what curettage of the diseased tissues of the tongue has done for this patient's constipation it also has done for her long standing extreme dysmenorrhea.

This story, in almost its exact language, could be told of another case in which, however, our efforts were aimed solely at the relief of an infection of quite a different nature.

We are fully aware that the observations recorded in this report represent only a very few of the facts which ultimately will be revealed in this practically untilled field of almost limitless possibilities, but, nevertheless, the amount of evidence thus far accumulated seems to be sufficient to offer an ever brightening promise that while the elimination of the exudates from the almost universally infected tongue may extend the length of the lease of life, it will also, quite certainly, insure that which is far more to be desired—an increase in the reserves of health.

REFERENCES.

1. ALLEN: *Human Anatomy*, 1883.
2. WRIGHT and SMITH: *Diseases of the Nose and Throat*, 1914.

150 JORALEMON STREET.

Auricular Fibrillation

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INTRODUCTORY.

It is generally recognized that within recent years there has been a great advance in our knowledge of cardiac disorders. By means of the clinical polygraph and of the electrocardiograph we are able to obtain records of the movements of both the auricles and ventricles, and also to make out the time relations of the contractions of these chambers; unlike the sphygmograph, which affords information regarding the movements of the left ventricle alone. Among the discoveries resulting from the employment of graphic methods in the study of heart disease probably the most important is that of auricular fibrillation; indeed, it is not too much to say that it is one of the greatest regarding the functional pathology of the heart which has ever been made. It is of the utmost practical importance that the condition should be recognized with regard to the diagnosis, prognosis, and treatment of cardiac affections. Auricular fibrillation is a specific clinical condition, which can be recognized with certainty. It is characterized, in the large majority of cases, by complete irregularity of the arterial pulse, and also by absence of all signs of the normal contraction of the auricles. It accounts for approximately fifty per cent. of all cases of persistent irregularity of the heart, and it is found in from sixty to seventy per cent. of all cases of serious cardiac failure with dropsy. Mackenzie first described the condition as nodal rhythm,[1] and the irregularity peculiar to the condition has been known variously as pulsus arhythmicus, pulsus irregularis, pulsus irregularis perpetuus, and the mitral pulse.

NATURE OF AURICULAR FIBRILLATION.

By auricular fibrillation is meant a condition in which coordinate contraction in the auricle is replaced by incoordinate contraction; the individual fibers, instead of contracting in an orderly and simultaneous manner, do so rapidly and independently of each other, with the result that systole of the chamber as a whole never takes place. When auricular fibrillation has once set in, in the great majority of cases it persists for the remainder of life. But, instead of this, it may appear for a few hours only, and never return, or it may occur at infrequent intervals for weeks or months, and then cease. Many cases of paroxysmal tachycardia are due to paroxysms of auricular fibrillation, and may last for a few seconds or may continue for months.

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[1] In what is termed nodal rhythm, the stimulus for contraction arises in some part of the auriculoventricular junctional tissues, giving rise to simultaneous contraction of both auricle and ventricle.

The tendency to occurrence increases, however, until finally the condition usually becomes permanent.

EFFECT OF AURICULAR FIBRILLATION ON THE HEART.

The effect of auricular fibrillation on the heart's action is usually pronounced. Instead of the ventricle receiving stimuli from the auricle at regular intervals, it receives them at completely irregular intervals. Further, the impulses which escape are numerous, and, if the conducting tissues are able to transmit them, the ventricular rate rises. Thus, an irregular, and, in the large majority of cases, a much too frequent pulse is produced. Such a change in the action of the ventricle, as a rule, produces a decided effect on the heart's efficiency.

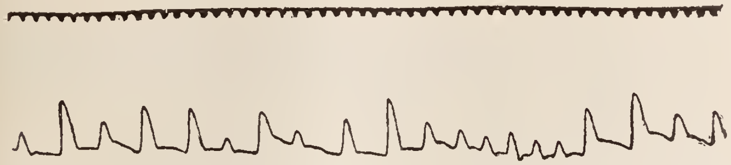

Fig. 1.—Tracing of the radial pulse, from a case of auricular fibrillation, showing complete irregularity of the pulse.

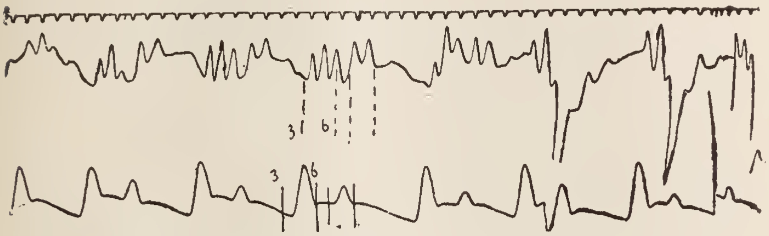

Fig. 2. Simultaneous tracings of the jugular and radial pulses, from a case of auricular fibrillation not under the influence of digitalis, showing coupled beats.

ETIOLOGY.

The majority of cases of auricular fibrillation falls within two groups: 1, those with a history of rheumatism, and, 2, patients suffering from myocardial degeneration. In the case of the former, the condition occurs more commonly in early adult life, and the patients frequently have valvular disease —more often mitral than aortic disease, and more especially mitral stenosis. In the second group of cases, the condition is more common after middle age. Auricular fibrillation has also been found occasionally in pneumonia, diphtheria, infective endocarditis, and the terminal stages of various exhausting diseases. Full doses of digitalis may produce it in predisposed cases, but only rarely. It is occasionally noted in aged people who exhibit no other symptoms or signs referable to the heart, so long as the pulse rate does not exceed the normal for their age. Its onset can now and again be traced to bodily effort, especially in the middleaged or elderly.

SYMPTOMS.

Patients with auricular fibrillation frequently complain of fluttering in the precordium, or of irregular action of the heart, or of both, possibly only on exertion. Apart from this consciousness of the heart's action, there is occasionally an absence of subjective symptoms. But, when the ventricular rate is much above the normal, symptoms as a rule are present, and these are the same as those of cardiac failure from other causes, such as shortness of breath, a sense of exhaustion, cyanosis, and dropsy. It would appear, however, that patients suffering from auricular fibrillation rarely suffer from definite attacks of angina pectoris. When the pulse rate is very slow, the Adams-Stokes syndrome may be present.

The degree of cardiac failure which arises as a result of auricular fibrillation may be slight or very severe. It depends upon, a, the rate of the ventricular action and, b, the degree of inherent muscle defect. As a rule, the onset of symptoms is gradual, but may ensue rapidly and the patient becomes very ill within a few hours. Similarly, the cessation of auricular fibrillation may be accompanied by an equally rapid improvement in the patient's condition.

The character of the pulse is very important. There is a wide variation in the ventricular rate, according as the pathway for impulses to the ventricle is free or interfered with, ranging from 40 to 140 or even 180 a minute, the average rate being between 90 and 140. The rate of the radial pulse does not necessarily represent the ventricular rate, for many beats of the heart may not be transmitted to the wrist, especially when the ventricle is beating rapidly; the ventricular rate, therefore, should be counted at the apex, either by palpation or preferably by auscultation. The pulse in auricular fibrillation is irregular, the irregularity in the majority of cases being continuous and persisting for the rest of the patient's life, in this respect differing from other types of cardiac irregularity. A feature of even greater importance is the fact that the irregularity is complete. In a sphygmogram it will be found that two beats of the same length or character

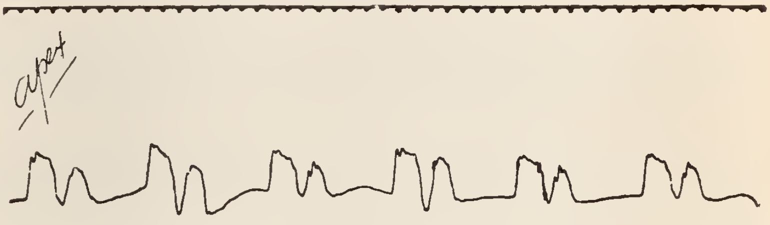

Fig. 3.—Tracing of the apex beat, from a case of auricular fibrillation, fully under the influence of digitalis, showing coupled beats.

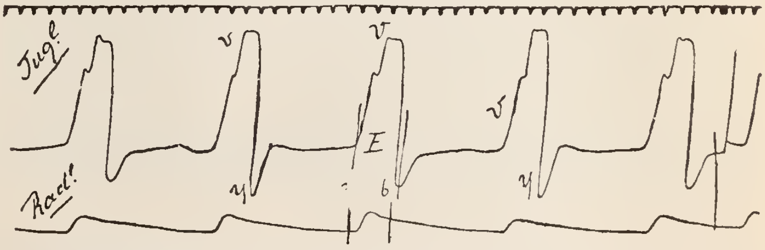

Fig. 4.—Simultaneous tracings of the jugular and radial pulses, from a case of auricular fibrillation, showing the ventricular form of venous pulse, and an unusually slow radial pulse.

rarely follow each other. There is often no relation between the length of a pause and the strength of the beat which follows it—i. e.: a short pause may be followed by a strong beat, and a long pause by a weak beat (Fig. 1). The beats may be coupled for long or short periods, and this may occur independently of the action of digitalis (Fig. 2), although it is usually due to it (Fig. 3). When the ventricular rate is slow (Fig. 4), or very rapid, the irregularity may be only slight, and we may have to adopt careful measurements of the sphygmogram to detect it.

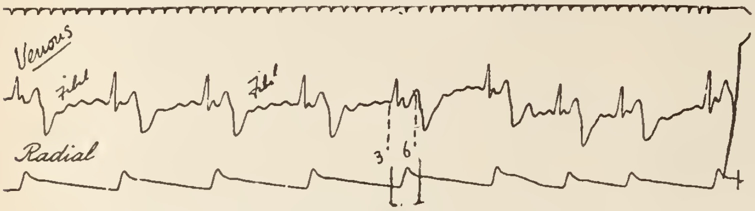

Fig. 5.—Simultaneous tracings of the jugular and radial pulses, from a case of auricular fibrillation, showing multiple undulations (marked Fibl.) in the plebogram, caused by the fibrillating auricle.

In cases of mitral stenosis in which a presystolic bruit, due to auricular systole, is present, this disappears with the onset of auricular fibrillation; whilst a diastolic bruit, if present, persists. The jugular veins may be so distended that there is no visible pulsation in them. When pulsation is visible, however, it is of the positive type, only one wave being visible, this occurring during ventricular systole. In a tracing of the jugular vein, there is an absence of the normal a wave; in other words, there is the ventricular form of venous pulse (Fig. 4). The normal a wave, being due to the contraction of the auricle, cannot be present, because the auricle does not contract. On the other hand, in cases in which there is infrequent cardiac action, multiple undulations, caused by the fibrillating auricle, may be present during diastole (Fig. 5). There is also an absence of the normal a wave in the cardiogram (Fig. 6), and in a tracing of the liver pulse (Fig. 7).

The electrocardiogram is characteristic (Fig. 8). The ventricular complexes are separated by irregularly irregular intervals; intervals of the same length rarely follow one another, and the pauses show no relationship to each other. The amplitude of the R deflections also varies from cycle to cycle. Further, there is often no relationship between the length of a pause and the amplitude of the R deflection which follows it, i. e., a short pause may be followed by an R deflection of large amplitude, and a long pause by one of small amplitude. When the ventricular rate is slow, the irregularity may be only very slight, and the amplitude of the R deflections is almost constant. As the ventricle receives stimuli from the auricle through the normal channel, the ventricular deflections are of normal form; T, however, may show inversion.

There is an absence of P deflections; these cannot be present, because the auricle does not contract. There are, on the other hand, oscillations, caused by the fibrillating auricle, occurring at the rate of from 400 to 600 a minute, and irregular in time and form, during diastole. These are most evident in cases of slow cardiac action, whereas in frequent cardiac action it is often difficult to make them out. Their size varies, being sometimes very minute and sometimes of considerable size. They may coincide with the T deflections, in which case the outline of the latter is altered.

DIAGNOSIS.

Auricular fibrillation can be diagnosed with absolute certainty when complete irregularity of the arterial pulse, the ventricular form of venous pulse, and multiple undulations in the jugular pulse are present, together with an absence of all signs of an auricular wave in a tracing of the apex beat and of the liver pulse, or on electrocardiographic examination. We may be sure, too, that auricular fibrillation is present, when there is complete irregularity of the pulse in conjunction with the ventricular form of venous pulse; indeed, we may be reasonably certain of its existence from the mere presence of complete irregularity of the pulse.

With regard to polygraphic tracings, it is necessary to point out that the h or b wave is occasionally seen in cases of auricular fibrillation, more especially in relatively slow acting hearts, and may exhibit some resemblance to an a wave. A differential diagnosis is possible; for the h or b wave may be distinguished from an a wave by the constancy of its relation to the preceding systole, while the distance which separates it from the c or v wave of the following systole will be found to vary in different cardiac cycles.

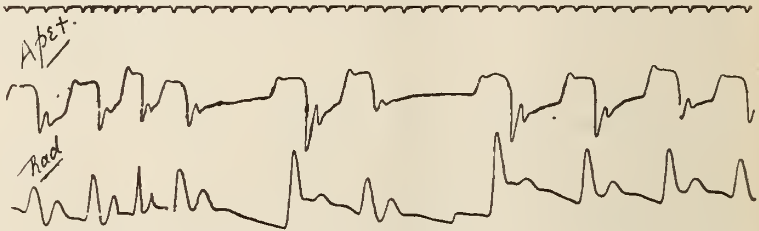

Fig. 6.—Simultaneous tracings of the apex beat and of the radial pulse, from a case of auricular fibrillation, showing absence of the normal a wave in the cardiogram.

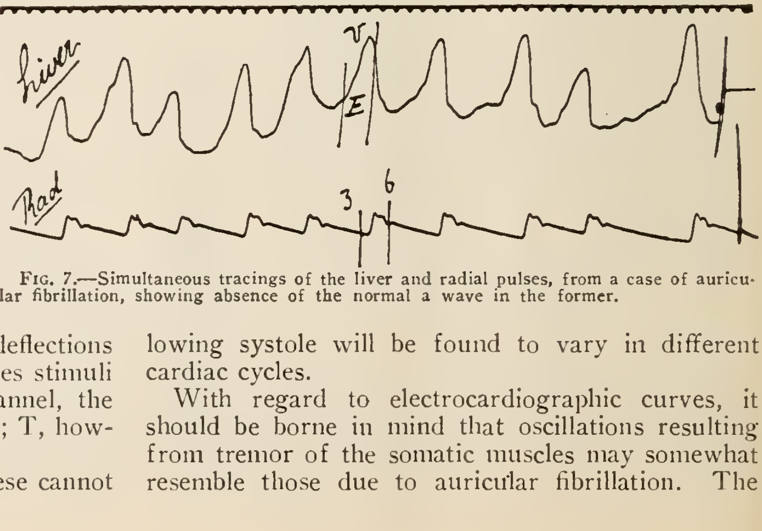

Fig. 7.—Simultaneous tracings of the liver and radial pulses, from a case of auricular fibrillation, showing absence of the normal a wave in the former.

With regard to electrocardiographic curves, it should be borne in mind that oscillations resulting from tremor of the somatic muscles may somewhat resemble those due to auricular fibrillation. The former, however, may readily be distinguished by the fact that they are of more frequent occurrence—being at the rate of about 50 per second, they occur at regular intervals, the deflection P or some indication of it may be noted, and the ventricular complexes do not occur at irregularly irregular intervals.

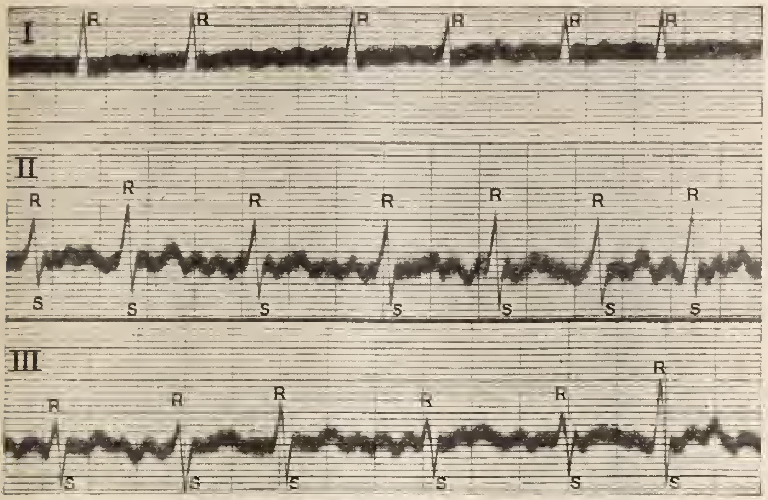

FIG. 8.—Electrocardiogram from a case of auricular fibrillation.

It is further necessary to distinguish the electrocardiograms of auricular flutter from those of auricular fibrillation. In the case of the latter, however, the R deflections occur at irregularly irregular intervals; the amplitude of the R. deflection varies from cycle to cycle, and there is often no relation between the length of a pause and the amplitude of the deflection R which follows it, i. e., a short pause may be followed by an R deflection of large amplitude, and a long pause by one of small amplitude. In the case of auricular flutter (Fig. 9), it will be found that these features are not present, even though the ventricular rhythm is markedly irregular. Further, the deflections due to auricular systole in cases of auricular flutter may be distinguished from the waves that are found in auricular fibrillation. In the case of the former, they are less frequent, ranging between 180 and 380 a minute, rhythmic, and of constant form in each lead; whereas, in auricular fibrillation the deflections are more numerous, ranging between 380 and 500 a minute, irregular in rhythm, inconstant in form in each lead, and smaller in size.

PROGNOSIS.

Auricular fibrillation is, in the great majority of cases, indicative of some myocardial disease. Furthermore, the rapidity and irregularity of the heart's action, which are usually associated with the condition, necessarily embarrass the functional efficiency of the organ. Put briefly, the prognosis of auricular fibrillation depends upon the capacity of the heart to carry on its work under the new rate and rhythm, and this in turn depends upon the integrity of the cardiac muscle. If this is relatively good, there may be for years little or no indication of cardiac failure. In the great majority of cases, however, this is not the case, and so heart failure results. This is especially the case when the pulse rate is rapid and the heart is dilated. The rate of the pulse is of great prognostic importance, a persistent rate of 120 or over usually being of serious omen.

Occasionally, with the inception of auricular fibrillation grave cardiac failure may supervene with surprising rapidity, and death may follow within a few weeks, or even days. In endeavoring to form a prognosis, a point of the utmost importance is to ascertain how the heart responds to treatment. Cases of auricular fibrillation form a group quite by themselves in the way in which they respond to digitalis or one of its allies; the majority respond in a striking manner and sometimes the drug is almost a specific, more especially in the rheumatic group. Another point of the utmost importance in weighing the prognosis is to ascertain how far the patient is able to modify his life, so as to bring it within the limits of the heart's strength.

As has been pointed out, attacks of auricular fibrillation usually have a tendency to become more frequent, until ultimately the condition becomes permanent.

TREATMENT.

This is of the greatest importance. Whether there is mitral disease, aortic disease, or disease of the myocardium, if the ventricular rate is rapid, digitalis or one of its allies should be administered, the results, in the majority of cases, being very good and, in some cases, being extraordinarily good; there is a rapid fall in the pulse rate (Fig. 10), and a concomitant improvement in the general symptoms. Two exceptions are: 1, some cases of wellmarked myocardial degeneration, and, 2, cases in which there is accompanying pyrexia. In the latter, appar-

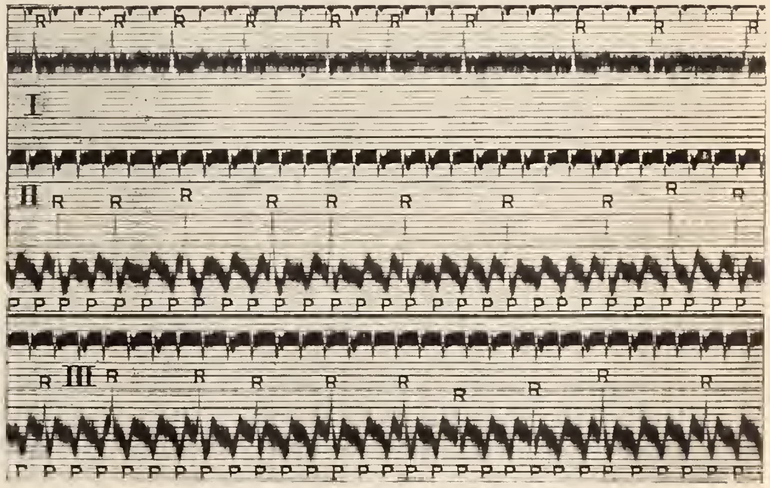

FIG. 9.—Electrocardiogram from a case of auricular flutter. The auriculoventricular rate is sometimes 2: 1, at others 3: 1, and at others again 4: 1. The response of the ventricle to auricular contraction being at irregular intervals, there is irregularity of the ventricular rhythm.

ently the response to digitalis, if present at all, is, as a rule, very slight.

With regard to dosage, my custom is to begin with a dram of the tincture a day, or in urgent cases even one and one half or two drams a day, and to continue until there is nausea or vomiting, diarrhea, headache, an unduly slow pulse, or what is called coupling of the beats. The drug should then be stopped until these symptoms have passed away, which is generally in a few days. In the great majority of cases the patient relapses, and the indication then is to find out what dose suits him best; that is, the dose sufficient to control the action of the heart, without at the same time giving rise to any toxic symptoms; this may require weeks or even months of careful observation. I generally begin with half the original dose, and this can be increased or diminished according as the rate of the heart increases or diminishes. In this connection, help may frequently be obtained from the patient himself, who is often able to say what dose suits him best; in other words, the patient's own sensations are often a good guide, and should be taken into account, as well as the pulse rate. The dose necessary in individual cases may exhibit a wide variation; it may be as small as a dram of the tincture a week, or as large as forty-five minims or even more a day. Having discovered this dose, it will be necessary, in the great majority of cases, for the patient to continue the drug for the remainder of his life. In the course of time, variations in the dose may be found to become necessary. The cumulative action of the digitalis is apparently not nearly so important as has been believed; at the same time, the pulse ought to be watched. Coupling of the beats is a danger signal, and we should either stop the drug for a few days or diminish the dose.

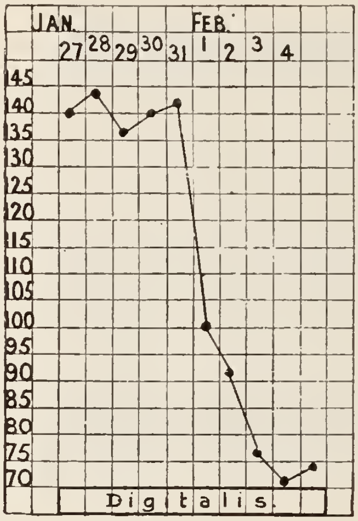

FIG. 10.—Chart showing typical result on the cardiac rate of the administration of digitalis in a case of auricular fibrillation with tachycardia. A dram of the tincture per diem was commenced on January 27th.

Intravenous injections of strophanthin may be used in urgent cases of cardiac failure, when it may be advisable to obtain a more speedy result than is possible by the administration of one of the digitalis series of the drugs by mouth. I myself employ one dose of one hundredth of a grain, or two or three doses of one two hundred and fiftieth of a grain every two hours. This may be followed by the administration of tincture of digitalis by the mouth, when advisable.

When auricular fibrillation is not accompanied by a rapid pulse, no decided result usually follows the administration of digitalis; indeed, it is often difficult to be certain how far the improvement may be due to the rest in bed and other measures adopted, apart from the effect of the drug.

Recently, quinidine sulphate, administered by the mouth, has been tried, with the object of arresting the condition. One hundred and thirty-five cases have so far been published, and in seventy-five, that is in fifty-five per cent. of these, the normal rhythm has been restored. The drug seems to be a valuable addition to the treatment of this condition, but it should be employed with caution, and perhaps a preliminary course with a small dose for a day or two is advisable. There appears to be a real danger of embolism.

Influenzal Sinusitis*

By HARMON SMITH, M.D., F.A.C.S.,
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The selection of this title is based upon the experience incident to the recent epidemic of influenza. While the etiology of infective sinusitis is not confined to influenza, one may accurately affirm that the largest proportion of cases is a sequence to or a complication of this infection.

The teeth play a minor part in the infection of the sinuses and then only of the antra. The manifold types of infection following the common cold produce a corresponding involvement of the accessory sinuses, varying from a catarrhal sinusitis to a well established empyema. But in all cases of pronounced influenza there is every reason to anticipate a complication of the accessory sinuses or of the middle ear.

In my own experience in the recent epidemic, or pseudoepidemic of influenza, the well to do classes have been unusually afflicted with complications of sinusitis, otitis media, and pneumonia. The influenza bacillus gains access to the accessory sinuses either by continuity or by having the microorganism forced into the sinus by violent fits of coughing or blowing the nose. The invasion seldom occurs in the first stages of the disease, but apparently follows the abatement of the acute manifestations and impresses upon the patient the picture of a relapse. The temperature from the influenza has often become normal or nearly normal. The aches and pains have disappeared. The appetite has returned and, barring the weakness due to physical exertion, the patient is inclined to and often does resume the ordinary pursuits of life. Without undue exposure or departure from ordinary habits he suddenly feels chilly, the head feels full, the eyes ache, the brain relaxes, the body becomes lethargic, and all the symptoms of an acute head cold suddenly appear. In twelve to twenty-four hours there is a dull pain over the frontal region or over the antrum, mastication is painful, and the head aches particularly when the patient bends forward. Local tenderness is experienced at the inner canthus of the eyes, or supraorbitally. There is a rise of temperature and if the sphenoids are involved there is occipital pain—the eyeballs hurt and there is a dull pain behind the eyes upon pressure. At this period the patient is generally referred to the specialist, who upon examining the patient is able to determine the side involved, the sinus involved and the methods best adapted to eliminate the difficulty.

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*Read before the Queens County Medical Society, March 28, 1922.

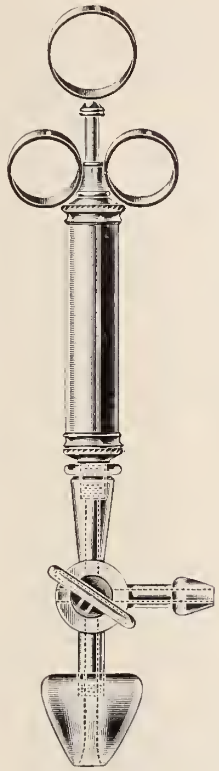

Fig.—The author's suction sinus syringe.

DIAGNOSIS.

The diagnosis is based upon: 1, Localized pain; 2, geographical appearance of pus in the nose; 3, transillumination, and, 4, x ray interpretation. When the maxillary sinus is involved painful sensations are experienced by the patient upon mastication and a general sensation of fullness and discomfort is felt upon the side involved. The voice is nonresonant and has a dead solid sound which on speaking is imparted to the ear of the involved side. The examiner elicits pain upon pressure over the canine fossa externally; by tapping the teeth with a tongue depressor and finally by placing the thumb in the mouth and the index finger externally over the antrum bring the two together with force. The presence of pus in the middle meatus and covering the inferior turbinate, whether there by natural drainage or after shrinking with cocaine and adrenalin, or after suction or from gravity drainage induced by holding the head bent well forward between the knees, demonstrates the involvement of either the maxillary or the frontal sinus, or the anterior ethmoidal cells. The determination of which one of these accessory sinuses is concerned is ascertained by elimination.

The next step immediately at hand is transillumination. This is accomplished by means of one of the transilluminators now employed by the specialists, and its application is not confined to office employment, but may, by means of the rheostat, be employed in any house supplied with electricity. Transillumination is by no means infallible, but in conjunction with other diagnostic measures furnishes another link in the chain of evidence. The positive findings show a marked reduction of light on the involved side. If both sides are involved equally it lessens the accuracy of diagnosis. The errors of transillumination are due to the presence of a dental plate; to an exaggerated thickness or thinness of bone, to previous involvement of the sinus leaving a thickened membrane, or to scar tissue over the sinus externally, due possibly to abscess or to the removal of carious bone.

The last and final element of diagnosis is the x ray. This, too, is circumscribed in its efficiency by the technic of the röntgenologist, by thickened membrane, density of bone, or the presence of a mucocele, which thins the walls of the sinus.

What has been said of the maxillary sinus may as well be applied to the frontal. Here pain is elicited by tapping over the supraorbital region and pressing upwards under the supraorbital ridge. Transillumination is even less definite than when applied to the antrum, for the angle of approach determines, in a large measure, the degree of illumination. The light should be only of such density as to illumine the distal phalanx of the index finger, and from this as a comparison the relative transillumination of the frontal sinus is determined. In many instances the heavy overhang of the supraorbital arch is of such character that light of the specified intensity will not penetrate, and it is only by increasing this intensity and by relative comparison with the opposite side that any deduction is possible. The same elements of error obtain with the x ray, and here scar tissue, such as may result from the cutting of the supraorbital nerve for neuralgia, will stultify the x ray findings. Pain on pressure over the frontal sinus likewise is complicated by involvement of the supraorbital nerve. The ethmoids may evidence involvement by pain experienced from pressure without inwards at the inner canthus of the eye. But subjective pain is often felt here without pressure even in catarrhal colds. Congestion within the nose from any of the forms of rhinitis will occasion pain here, associated with a tired feeling in the eyes. Transillumination and x ray are equally unreliable here, for there are few patients who have not had more or less ethmoiditis and will show evidence of the involvement in both transillumination and x ray. There is seldom a report coming from our röntgenologist which does not say "granulations or thickened membrane in the ethmoidal cells."

RÔLE PLAYED BY THE SPHENOID.

Now the sphenoid is possibly one of the most frequently involved of the sinuses, but being the most remote and the most difficult of diagnosis escapes observation. How many headaches, how many pains behind the eyes, how many cases of nasopharyngitis, and postnasal drippings are due to sphenoiditis, we scarcely realize. I am acquainted with a number of cases in my own and confrères' experiences where mental depression, lack of physical stamina, and loss of energy associated with ocular disturbances have been eradicated by elimination of sphenoidal sinusitis.

But at present we are only interested in the acute involvement of this sinus from influenza. Pain is evinced by the patient as existing behind the eye, and in the back of the head and neck. Transillumination is impossible. Pressure against the anterior wall of the sinus is negative, for there is always pain when feeling in the nasopharynx. X ray may show something or nothing; pus may be seen in the socalled sphenoidal recess, or in the nasopharynx, which determines that there is involvement of the sphenoid or posterior ethmoids. The Holmes pharyngoscope may show pus exuding from the sphenoid, in which case the diagnosis is positive. Now we have determined the presence of pus in one or all of the sinuses and the question of treatment arises.

Personally I am opposed to immediate operative interference in acute cases either by puncturing the antrum, removing the middle turbinate, or breaking down the anterior wall of the sphenoid.

All cases of sinusitis are not amenable to treatment alone. There are many instances where measures other than surgical would be considered unjustifiable. However, the greater number of these unavoidable surgical cases result from the patient not recognizing the gravity of the condition in its inception and consulting a specialist, or from the inadequate treatment administered by the one consulted. A majority of acute uncomplicated sinus infections in time will get well of themselves. The greater number of fatalities in sinusitis, likewise, result from operative interference rather than from the untreated, unhampered progress of the disease. Etiology, likewise, plays a large part in the success of treatment. As for instance, a maxillary sinusitis due to a diseased tooth or a foreign body in the antrum would not yield to anything but surgery. likewise a chronic sinusitis of long duration with polypi filling the cavity, and with polypi of granulations blocking the exit of the sinus, treatment, other than surgical, would be unavailing and an unwarranted waste of time. There are a number of cases, however, which do not come under these two classes where treatment of the kind I shall presently describe will be not only effective, but will obviate the undesirability of operative measures.

METHOD.

My method of procedure has been divided into two classes: first, that applied by myself in the office; second, that followed by the patient at home.

I apply on pledgets of cotton a one per cent. solution of cocaine and a one to 8,000 solution of adrenalin to the ostia or exits of the sinuses involved, so that the turbinates and the tissue in the immediate locality of the exit is slightly cocainized and shrunken. A similar procedure is also followed on the opposite side to reduce the puffy membrane which will facilitate free irrigation. After ample space has been obtained in each side of the nose to justify irrigation, I use a Douglass douche with a hot alkaline solution to wash out the nasal cavities. For this purpose I have found nothing better than a powder I have called alkanos.

When an ounce is added to the pint of hot water, it makes an alkaline, nonirritating, slightly antiseptic solution. By having the patient flex the head and neck well on the chest and with the head turned slightly to the well side, the solution is introduced by means of the Douglass douche and carried through the well side, behind the septum, and out through the involved side. If no force is employed other than is just necessary to carry a large volume of water through the nostrils and if the nostrils are open and the head well flexed, there is no danger to the eustachian tubes. Several of these douchings are performed before I employ suction. I sometimes use suction at the same time that douching is employed by means of the Loré suction tip—which is a modification of the two way ear irrigator. If I do not use this method, I take an ordinary suction bottle and only employ light suction in these acute cases—up to six or eight on the dial. I again wash from the nose the pus sucked from the sinuses and finally apply the suction syringe to introduce into the sinuses such medicated solutions as I consider to be applicable to the case. In the present epidemic I have almost entirely confined my use to collene, which is a nonirritating, noncorrosive colloidal silver solution in suspension, having the virtues of silver nitrate without its irritating sequence and more effective than argyrol with its disagreeable discolorations. The Smith's sinus syringe consists of an all metal syringe with a nasal tip fitted with a two way cock. It is first loaded with the medication, as any syringe is filled, with the thumb piece turned in the long axis of the syringe. After loading, the thumb piece is turned towards the suction tube which is attached to the fitting on the nose piece and to the suction apparatus of the pump. Only five to eight degrees of suction are employed, which is tested before placing the tip in the nose.

The patient is asked to close the opposite nostril from the one occupied by the nasal tip and is instructed to swallow or say "kah-kah-kah" and when the vacuum is obtained and the dial registers the five or eight degrees of suction, the operator turns the cock in the direction of the syringe and the medication is forced into the nose and accessory sinuses of that side. As a liquid will follow a released vacuum and as pressure of the piston still further accelerates this tendency, the disengaged medicament is forced into the previously emptied, infected sinuses. In this manner I have been successful in overcoming the majority of acutely infected sinuses and a large proportion of chronically infected sinuses. I know the medication enters the sinuses for I have demonstrated this to my own and my colleagues' satisfaction by employing colored solutions, which were in evidence after sucking and washing on the following day. As the infected sinus is left filled with the medicated solution employed, there is reason to conclude that a long continued application of a healing medicament will result advantageously to the patient. After this treatment I either introduce postnasally or spray intranasally albolene with five grains each added of camphor and menthol to the ounce to allay the irritation.

The patient can materially aid the doctor in the elimination of these difficulties by keeping the ostia patent and drainage going in the interim. To facilitate this I give the patient a solution of adrenalin, one to 8000 in rose water to spray the nose with every four hours to be followed by burying the face in a bath towel wrung from extremely hot water, so that at first the patient only inhales the steam and is able to apply the towel to the face and forehead gradually. This is applied with the patient sitting with the head and body bent well forward to aid by gravity the drainage of the sinuses. I also advice free catharsis, light diet and ample ingestion of water. I sometimes give some form of belladonna with powdered opium and aspirin to allay the pain, to shrink the mucosa and induce perspiration, all of which aid in elimination. Operative interference is only justified when there is agonizing pain, high temperature, failure in obtaining drainage and unsuccessful efforts in treatment.

SINUSITIS IN CHILDREN.

A great many children have sinusitis—more, in fact, than the ordinary observer would surmise. In the past year I have had a number of children referred to me by general practitioners with bronchial disturbances unaltered by the customary measures at their command. These cases have cleared up when the sinusitis disappeared. The pus drops into the trachea and bronchi during sleep and produces a cough which is more disturbing at night than in the day, and is associated with abundant expectoration. Again a number of cases of otitis media are due to sinusitis, in which the infection extends or is blown into the ear. Many of you will recall the experiences of your early boyhood or at least of your associates who had socalled colds each winter, lasting until summer, where many handkerchiefs were used and a thick, mucopurulent material, often bloodstained and of revolting nature, was in constant evidence, which were unquestionably subacute sinusitis cases. They also suffered from recurrent attacks of earache incident to the nasal stoppage and to the effort to blow the nose, thereby blowing pus into the ear. All of these would have been spared the earaches and the evils of diminished hearing if they had been treated by modern methods.

RESULTING FIBROSIS.

Whenever a sinus has once been invaded it is followed by an increased fibrosis in the lining membrane, just as any inflammation leaves its mark in an increased amount of fibrosis. So that recurrent sinusitis will ultimately result in thickening of the lining membrane of the cavity and both transillumination and the x ray will show the sinus to be apparently involved. This is why, as I have already remarked, the majority of cases referred to the radiographer returns with a report which says that the sinuses show either granulations or thickened membrane. Comparatively few reports ever come back from the radiographer declaring the sinuses to be normal. I, therefore, believe that an operator who relies too greatly upon the report of the radiographer for justification of his operative measures is making a grevious mistake.

I recently had a patient sent to me for operation upon the antrum presenting all the classical symptoms of maxillary sinusitis. The transillumination was positive, the pain on pressure positive, percussion on the teeth of the involved side positive, and there was some mucopus in the washings from the nose after shrinkage and irrigation. However, after careful elimination and examination I found an alveolar abscess at the root of a capped tooth, which extended up and over the anterior antral aspect and upon opening the abscess evacuated a quantity of pus and bloody serum, thus relieving the pain. This patient had been advised to have his antrum operated upon immediately.

SELECTION OF CASES.

Personally, I am loath to operate immediately upon either the acute or subacute sinus cases. Neither do I believe that the indiscriminate puncturing of the antrum is either necessary or warrantable. It is painful, is followed by a discomforting reaction and relieves the patient in no shorter period than the treatment already outlined. Operative measures by no means insure against subsequent reinfections, and I believe it so alters the mechanism of the parts as to induce rather than diminish reinfection.

In many patients presenting all the classical symptoms justifying operation, I have been enabled to cure them by this treatment, so that no further disturbance has arisen in a period of several years.

Every surgeon is prone to follow methods of his own selection and is unwilling to forsake them to employ something that is new and requires more time than that with which he is familiar; but if one is willing to familiarize himself with the technic of this treatment and to employ it conscientiously and persistently, a large part of the operative measures now employed can be avoided.

GENERAL CONSIDERATIONS.

The observations compiled in this paper refer to acute and subacute cases incident to influenza infection, and not to empyema induced by foreign bodies, carious teeth, and old chronic polypoid degenerative conditions, which will, of course, not yield other than to operative measures. Neither do I wish to include the acute infective type with excruciating pain, high temperature, and great constitutional depression.

I have quite recently had to perform an unavoidable operation upon both sphenoids in a young woman referred to me by Dr. Selfridge of San Francisco. The patient had influenza associated with follicular pharyngitis and lateral pharyngitis. Her temperature rose to 105° F. with delirium. I called in consultation a neurologist, to eliminate the possibility of meningeal disturbances. Her whole head, particularly the occiput and neck, gave her excruciating pain. Her pulse was irregular and thready and she would go into collapse at times. Her general practitioner suggested further consultation and Dr. Harlow Brooks did a complete physical examination and could find no cause for the continued increase in temperature or for the delirium. I suspected the sphenoids, but could gain no evidence of pus, and she was in no condition for an x ray. So I called in Dr. MacKenty, who agreed with me that the sphenoids were responsible.

I opened both sphenoids under cocaine, with the patient in bed, and evacuated the pus which relieved the delirium, though the elevation in the temperature remained for some time I have since opened the sphenoids still further and obliterated the posterior ethmoid cells, which a subsequent x ray showed to be involved. The patient has virtually recovered. This is the most exaggerated case of acute infection I have seen and treatment could not be carried on without endangering the patient's life. Operation was imperative.

44 West Forty-ninth Street.

Bronchoscopic Cases of Dental Origin*

By HENRY HALL FORBES, M.D., F.A.C.S.,

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The removal of foreign bodies which have become lodged in the bronchi still forms a large part of our work and their successful removal requires skill and ingenuity. The five cases which form the basis of this short paper are all different as to the circumstances surrounding the introduction of the foreign body, the result in the individual patient, and the lesson which I was able to draw when the cases were completed. While the five cases are all noted as of dental origin, four were truly accidental as far as the dental surgeon was concerned; only in two cases was the surgeon alive to the fact that an accident had occurred. With this in mind it seems wise that emphasis should be given to this point and the possibilities of accidents he brought again to the notice of the operating surgical dentists. My own experience in watching the work, as I have had frequent opportunity, gives me the impression that these men have been alive to this part of their work, and in blocking off the pharynx with gauze sponges before extracting tends to prevent the inhalation of a foreign body, blood clots or infected material. The inhalation of the gold crown was due to the nonuse of a rubber dam when placing the crown in position.

In a recent article by Heoblom (1), of the Mayo Clinic, an analysis of fifty-two cases was made, which included one of mine reported here. He dwelt especially on the possibility of pulmonary suppuration and bronchiectases. A lung abscess occurred in one of my cases. A broad lesson can be drawn by us as well as by dental surgeons on the possibility of a foreign body or the aspiration of infected blood or other material as a cause of irritating cough, pneumonia or lung abscess following an operation about the nose or mouth. Especially may this be the case where a tooth is broken or a filling loosened by a mouth gag.

GOLD CROWN IN RIGHT MAIN BRONCHUS.

Case I.—The patient, a male, aged eighty-two, was referred to me on October 27, 1913. This was my first case of foreign body. The patient, while having a gold crown fitted to the right upper canine tooth, coughed; the crown was loosened and disappeared. As coughing was an immediate result, the dentist thought that the crown had in all probability been inhaled. An x ray was taken by Dr. Judson Quimby who found a foreign body present in the right main bronchus and referred the case to me. The patient was immediately taken to the New York Post-Graduate Hospital where, under local anesthesia within four hours from the time of the accident, I removed the tooth crown with a Bruning type of bronchoscope. It is interesting to note that the measurement from the upper teeth to object as projected on chest was twenty-eight cm. and that measurement when the tube was passed was practically the same, twenty-seven cm. The patient remained in the hospital overnight. There were no complications and he was discharged cured.

TOOTH PLATE IN LEFT PRIMARY BRONCHUS.

Case II.—The patient, a male, aged forty-seven years, was referred to me by Dr. John F. Erdmann on August 11, 1916, with the following history. The patient, a native of Athens, Greece, had some months before during the night swallowed the portion of a tooth plate. Efforts were made at extraction in his home city, also in Rome and Lisbon. X rays showed the foreign body in the left primary bronchus. Under cocaine anesthesia the broken plate was removed at the New York Post-Graduate Hospital on August 12, 1916. There were no complications and the patient was discharged cured.

LUNG ABSCESS FROM ROOT AND SMALL PIECES OF TOOTH INHALED.

Case III.—The patient, a female, aged thirty-nine years, was referred by Dr. John F. Erdmann on August 27, 1917. This case was reported by me at a section meeting of the New York Academy of Medicine, and was the most distressing of the series. The history was as follows: About sixteen months before, the patient, when in excellent health had had removed, under general anesthesia, a number of teeth. Within a few weeks (note absence of early symptoms) a constant cough developed, accompanied by a profuse purulent expectoration. She lost in all some sixty-eight pounds in weight. About five weeks before her visit to me she coughed up a piece of bone. Up to this time a diagnosis of purulent bronchitis had been made. No tubercle bacilli were found in the sputum. X ray pictures taken shortly after coughing up the foreign body showed an abscess cavity in the lower part of the left upper lobe, but no foreign body. An x ray at the Post-Graduate Hospital showed the same condition. Bronchoscopy was performed eleven times under local anesthesia. A No. 9 Jackson tube was used and a suction tube was passed to opening of abscess cavity and pus evacuated. This was followed by an injection of one dram of fifteen per cent. argyrol solution, again passing suction tube to remove excess, Dr. Lynah assisting. I did not avail myself of the double tube of Dr. Yankauer, which was not known to me at that time. The shortest time for a treatment was three and a half minutes by myself and seven and a half by my house surgeon; that is the actual time from use of the laryngoscope to removal of bronchoscope. There was, however, no need for haste after the second treatment. I might add that the patient was brought to the hospital on a stretcher, having been told that she had not a week to live unless something was done. The amount of fluid brought up at the time of admission was one pint in twenty-four hours.

The x rays in this case were interesting and instructive. The first picture failed to show the presence of a foreign body, and yet the root of a tooth was coughed up after this by the patient. The x ray showed beautifully the abscess cavity and the level of the fluid. However, later x rays taken showed the fragments which were subsequently coughed up. Patient was well at last report.

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*Read at the fourth annual meeting of the American Bronchoscopic Society, June 1, 1921.

AMALGAM FILLING.

CASE IV.—Female, aged forty-two, of Bangor, Me., was referred to me by her family physician. In this case there was also a history of the extraction of a number of teeth under general anesthesia some two months before, sixteen in all. Following the operation she began to cough and have asthmatic attacks. The x ray showed the presence of a foreign body in the left primary bronchus. This was removed under cocaine anesthesia on July 20, 1920, at the New York Post-Graduate Hospital. There was no reaction and the patient was discharged.

AMALGAM FILLING—LEFT LOWER LOBE OF BRONCHUS.

CASE V.—The patient, a male, aged thirty-five, was referred to me by Dr. Judson Quimby, to whom the patient had been referred for an x ray. The history briefly was that on the day previous under gas anesthesia a number of teeth had been extracted. The dental surgeon, an excellent operator, failed to account for a small filling at the time of the operation. As the man on his return the next day seemed to have some slight irritation in the chest and a cough an x ray was taken, which showed a small foreign body low down in the left lung. That evening under cocaine anesthesia a hunt was made for the foreign body, but without success.

I kept him at the hospital for a week during which time he was seen by Dr. Imperatori and Dr. Lynah, who agreed that a second attempt should be made at extraction. The x ray showed the body still in same position. Using a long five mm. tube I again made a search for the foreign body, but with no success. Following both examinations the parts were sprayed with twenty-five per cent. argyrol solution. Following the second bronchoscopy there was a marked reaction and it was thought a small area of pneumonia was found. While great care was exercised over the sputum our third and last x ray (repeated) showed that the foreign body had disappeared. The patient was discharged, cured.

CONCLUSIONS.

1. Bronchoscopy early or late in all doubtful cases of possible foreign body inhalation following dental work under general anesthesia is indicated for diagnostic purposes.
2. While cough, dyspnea, asthmatic wheeze, and pain in chest may be present as symptoms at once, they may be absent, and the foreign body be expelled or found by x ray.[1]
3. Endoscopic treatment is indicated when abscess or bronchiectasis is present.

REFERENCES.

1. HEOBLOM, A.: Foreign Bodies of Dental Origin in a Bronchus Case, Mayo Clinic, Rochester, Minn.

Four Cases of Open Safety Pin in the Esophagus of Children Under Eleven Months of Age*

By ELLEN J. PATTERSON, M. D., F. A. C. S.,
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The problem of the nursing child with an open safety pin in the esophagus presents some difficulties peculiar to itself which are not encountered in the older child and the adult. It is essential that the pin be removed speedily without traumatism and without interruption of the feeding. If the pin should pass into the stomach or intestinal tract, the character of the diet is such that it does not assist the passage of the pin and cathartics are contraindicated.

The small size of the esophagus, leaving so little room for version or other manipulation, the possibility of encountering an enlarged thymus compressing both esophagus and trachea, and the great variability in the size of the esophagus in nursing infants add difficulty to esophagoscopy . Thymic compression of the trachea is relatively frequent in children and it is a particularly dangerous factor in esophagoscopy because of the increase in the stenosis caused by the rigid esophagoscope posteriorly, furnishing a firm resistance against which the hypertrophied thymus may press the trachea.

CASE I.—E. A., female, a normal, nursing infant, seven months of age, was admitted to the Presbyterian Hospital on June 22, 1918, with a history of having swallowed an open safety pin fifty-six hours before admission, without subsequent symptoms of any kind. The report of the röntgenologist, Dr. G. W. Grier, showed an open safety pin in the pylorus. The pin passed forty-eight hours later without difficulty and without having produced any symptoms during its five days sojourn in the alimentary tract.

CASE II.—F. A., male, a normal, nursing infant, ten months of age, was referred by Dr. O. M. Shreve, of Erie, Pa., with a history of having swallowed an open safety pin twenty-four hours before admission. The röntgenogram taken by Dr. G. W. Grier showed the pin open, point down, at the sternal notch. The small size of the presenting ring rendered it difficult to find the pin and it required three minutes and thirteen seconds to find and remove the foreign body. The child was given no anesthetic, there was no reaction, and no interruption of feeding.

CASE III.—M. H., female, a normal, nursing infant, seven and one half months of age, was admitted to the Presbyterian Hospital, June 2, 1919, with a history of having swallowed an open safety pin five days previously. The child had been unable to nurse after swallowing the pin, but could take a little water. Two unsuccessful esophagoscopic attempts had been made to remove the pin the same day, before the child was referred to me. Upon admission she was restless, fretful, unable to nurse, temperature 101° and in need of fluids. The radiograph showed the pin open point up at the sternal notch with the point buried in the soft tissues.

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As a rule I would not repeat esophagoscopy within twenty-four hours, but this child seemed too near the borderline of water starvation to permit of delay. I introduced the esophagoscope and removed the pin through the mouth without anesthesia, general or local, in one minute, twenty seconds. Three hours later the baby was nursing and was discharged well the next morning.

Case IV.—G. M., female, a normal, nursing infant, twelve months of age, referred by Dr. Sol Hartzell, of Youngstown, Ohio, October 2, 1919, with a history of having swallowed an open safety pin five hours previously. The child could nurse and had no symptoms of any disturbance. A radiograph, taken four hours previously, showed the pin lodged in the esophagus, a little farther below the sternal notch than usual, the point being upward and to the left. Upon introduction of the esophagoscope, without anesthesia, the pin was not found at the site indicated in the radiograph. It seemed unwise to search the deeper esophagus at this time because the child became quite dyspneic after the esophagoscope passed the cricopharyngeus. I therefore withdrew the tube and an immediate fluoroscopic examination showed the pin at the hiatus lying anteroposterior, point posterior. After remaining at the hiatus three days, the pin passed into the stomach, where it remained eleven days; two days after leaving the stomach it passed through the anus, having spent sixteen days in the digestive tract. The child nursed all the time without difficulty and was apparently normal in every way. In this case I had the mother feed the child some cereal and bread and milk and Dr. Grier fluoroscoped the child daily.

Case V.—C. B., male, a normal, nursing infant, ten months of age, was referred by Dr. F. T. Patterson, of Washington, Pa., March 11, 1921, with a history of having swallowed an open safety pin four hours previously. The röntgenologist, Dr. George W. Grier, gave me the following report: "X ray examination of Baby C. B. shows a small safety pin in the esophagus, open, breech down. The pin lies crossways of the body, the guard end of the pin being to the left side and the sharp end to the right. The lower edge of the pin is at the level of the sixth cervical vertebra. This baby has a slight enlargement of the thymus and a deformed trachea, there being a bend in the trachea about the level of the first dorsal vertebra."

I did esophagoscopy without anesthesia but not finding the pin after one minute and bearing in mind the enlarged thymus and deviated trachea, I withdrew the tube and had another radiograph taken. The radiograph showed the pin had shifted its position to the level of the fifth dorsal vertebra.

There was no reaction following esophagoscopy, no interruption of nursing and as the infant was normal in every way, I waited until early morning of March 13, 1921, before doing another esophagoscopy. At esophagoscopy, without anesthesia, I seized the keeper and rotated it to the right until I could see the breech. Then seizing the breech withdrew pin and tube together without any difficulty in three minutes and forty-four seconds. There was no interruption of nursing, no reaction, and child was discharged well in twenty-four hours.

Of the five cases of open safety pin in the gastrointestinal tract all but one were babies under eleven months of age. The pin was in the stomach of one patient when admitted. In one other case it reached the stomach after admission. In both of these cases the pin passed through the intestinal tract harmlessly. In three cases I removed the pins from the esophagus by esophagoscopy, without anethesia, general or local. All three infants were discharged well the next day. The pins in Cases I and IV were exactly the same size, open at the same angle, yet the pin passed through the whole digestive tract of a seven months infant in five days, and lodged three days at the hiatus, eleven days in the stomach or sixteen days in the digestive tract of a twelve months old child. The pin in Case V was much smaller than in Cases I and IV, yet it lodged in the esophagus at the fifth dorsal vertebra for thirty hours.

CONCLUSIONS.

1. As to prophylaxis, the great number of cases of safety pins, usually open, in babies, seems to call urgently for a warning against leaving pins within their reach. Since these accidents with nursing babies usually happen through ignorance on the part of the mothers, I think all pediatrists and all nurses connected with public health nursing and milk stations should caution mothers not to stick pins in the front of the dress while changing the babies. They should be cautioned to have diaper pins fastened together by chains, together with the small safety pins for the stockings. This simple precaution would avoid a serious accident which might endanger the life of the child.

2. An open safety pin that has reached the stomach may pass through the intestinal tract harmlessly in five days, but this does not justify incurring the great danger of attempts to push it down and the pins should be watched daily with the fluoroscope. Dr. Chevalier Jackson (1) reports one case where an open safety pin was regurgitated into the esophagus after a seven weeks' sojourn in the stomach of a twelve months old child.

3. Open safety pins that lodge in the esophagus should be removed at once by esophagoscopy, without anesthesia.

4. Compression of the trachea by an enlarged thymus is enormously increased by engorgement during esophagoscopy.

5. This compression is increased by overextension of the head.

6. Before doing esophagoscopy on young children, especially under twelve months of age, the size and condition of the thymus gland should always be determined as far as possible.

REFERENCES.

1. Jackson: *Journal A. M. A.*, vol. lxxvi, pp. 577-79.

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Two Cases of Lung Tumor Treated Bronchoscopically*

By SIDNEY YANKAUER, M.D.,
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Case I.—A man, twenty-eight years of age, was admitted to the medical service of Mt. Sinai Hospital on September 26, 1920, stating that eight weeks before he awoke suddenly with chills, fever, nausea, headache and pain in the left side of the chest. These symptoms continued intermittently up to the date of admission. Cough and profuse, purulent expectoration increasing in amount were present during this time and there was considerable loss of flesh and strength. Examintion of the chest showed on the left side delayed and diminished expansion, dullness on percussion above, merging into flatness in the lower part of the chest; voice and breathing diminished above, absent below. The sputum was negative for tubercle bacilli, there was a moderate leucocytosis, distinct clubbing of the fingers and temperature above 103°. Radiograph showed an infiltration of the greater part of the left lung from the apex to the base with the heart drawn to the left side.

The patient was then transferred to the surgical division for aspiration. He was aspirated twelve times in different places with negative result. Following the aspiration, a pneumothorax developed. Radiograph taken at this time showed the consolidated lung drawn towards the hilum, with an area of pneumothorax adjacent to the chest wall. The pneumothorax gradually disappeared, but the symptoms, physical signs and general condition of the patient remained about the same.

On November 11th, I made a bronchoscopic examination for diagnostic purposes. I found the left main bronchus to be normal in size, color and contour for a distance of two cm. from the bifurcation. At this point, the lumen ended abruptly being closed by a mass covered with smooth, normal looking mucous membrane. Examination with the probe showed that the mass was attached to the outer wall of the bronchus above the opening of the upper lobe branch, leaving only a minute opening in the anterior part through which pus was seen coming with each expiration. The appearance of the tumor resembled so closely a fibroma of the bronchus in nearly the identical situation which I reported before the laryngological section of the New York Academy of Medicine in 1916 that I did not hesitate to make the diagnosis of benign tumor.

On November 16th, under local anesthesia, an attempt was made to pass a snare around the tumor, but as the base of the mass was too wide, the snare would not take hold. The mass was then removed piecemeal with biting forceps. Immediately after the removal of the tumor, breathing could be faintly heard in the lower part of the chest. Microscopic examination of the tumor showed it to be a pure fibroma.

On December 13th the patient's general condition was much improved, the cough had ceased, the patient had gained in weight, and the physical signs in the chest had almost entirely cleared up. A bronchoscopic examination made at this time failed to disclose any remnants of the tumor. A radiograph made on December 22nd showed only a small infiltration at the extreme left base. At the time this report was made the patient had no symptoms of any kind and was apparently completely cured.

Case II.—This patient, a man of fifty, was first seen by me on September 1, 1920. He stated that since 1918 he had suffered from cough, increasing in severity, with an increasing amount of expectoration, which occasionally was blood stained. He also had pain in his left chest. His previous health and family history were good. A radiograph taken in the early stage of his disease showed the presence of an old healed tuberculosis, of which the patient was ever conscious, in the right upper lobe, and believing that the patient was suffering from a recrudescence of his old tuberculosis, his physician sent him to Saranac. Here he was repeatedly examined. Tubercle bacilli were never found, but on the contrary, physical signs appeared in the lower part of the left chest, and a shadow appeared in the radiograph. His condition became decidedly worse in the course of the year, so that he was sent back to New York. Here the diagnosis of lung tumor was made by the internists, by exclusion.

On September 10, 1921, a bronchoscopic examination was made for diagnosis. I found the lower part of the left bronchus, below the opening of the upper lobe branch, completely occluded by the pressure of an intrabronchial mass, which apparently made pressure on the anterior and external walls of the bronchus. The mucous membrane, especially on the external wall, was thickened and granular in appearance, suggestive of malignancy. A specimen was removed for examination, but the pathologist reported that it consisted of inflammatory tissue only. The radiograph at this time showed a mass extending from the fifth rib to the diaphragm, and from the heart shadow nearly to the outer wall of the chest. On fluoroscopic examination it could be shown to be free from the heart and from the diaphragm.

In the absence of a positive diagnosis of malignancy the case was treated as a lung abscess by irrigations with iodine solutions. After six weekly treatments, although the cough and expectoration were considerably diminished, the occlusion of the bronchus, as seen in the bronchoscope, had increased, having by this time reached nearly to the level of the upper lobe branch. Treatment with radium was therefore begun. The radium was applied in the form of radium emanations. These emanations were contained in a metallic capsule, covered with rubber, so that the rays were filtered through one quarter mm. of silver, one mm. of brass and one mm. of rubber. The capsule contained fifty to sixty m. c. of emanations. It was introduced into the bronchus through the bronchoscope, and a cord attached to the capsule was left hanging from the mouth . It was well tolerated by the patient and was removed after four to six hours. At the same time two external applications were made, one below the angle of the scapula and another in the anterior axillary line, the applicators being flat rectangles containing the emanations, about seventy-five m. c. each. These applicators consisted of eight to twelve emanation tubes encased in silver one quarter mm. thick, and filtered with two and a half mm. brass, two mm. leather and two cm. gauze. They were left in place about twelve hours. Eight of these applications were made, at intervals of two weeks. Between these applications, the bronchus was irrigated and an external application only made. Altogether the patient received in fifteen weeks two thousand m. c. intrabronchially and twenty-five thousand m. c. externally.

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The first radium application was made on October 22d and by December 1st the patient's condition, both subjectively and objectively, as well as in the bronchoscopic picture, had improved materially, as shown by a radiograph taken on December 1st. On December 17th a radiograph showing the capsule in position was made, and showed an additional improvement.

At present the patient is entirely free from cough and expectoration, he has increased in weight and in strength, and feels subjectively like a well man.

He suffered no inconvenience from the radium applications except a discoloration of the skin of the chest, with some desquamation and pruritis, and he has suffered an attack of herpes zoster over the burned area, but this was only a temporary inconvenience. The ultimate outcome of the case will be recorded at some future time.

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Treatment of Suppurative Conditions of the Lung*

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The subject under discussion must necessarily include something concerning etiology, for upon this in many cases depends the method of treatment. We shall therefore first discuss the avenues and processes by which infection takes place.

Many times infection probably takes place through the lymphatics, from suppurative conditions above, as from the tonsils, teeth, or sinuses, and the excellent work along this line with which such names as Robertson, Wood and Mullin are connected must be considered. Whether or not we agree that the larger percentage of chest infections are received in this way, we must admit that the supply from these sources lays a vast burden on the otolaryngologist if he is to accomplish anything in the prophylaxis of these maladies. The lymphatics from the tonsil drain into the anterior triangle, as do also those from the lower teeth, while lymph vessels from the nasopharynx drain into the posterior triangle. The superficial cervicals continue downward to the root of the neck, to the apex of the lung and the thoracic duct, while the deep chains descend to the mediastinum and hilum. This has been amply proved by the experiments of the workers mentioned above and others and by clinical evidence, as mentioned by New and myself, as well as postmortem evidence.

Hematogenous infection, while difficult to prove in living patients, cannot be denied, as shown by Adami, Delafield, and others. However, we think chest infection by this route occurs much less frequently than the writings of many would have us believe. We may have infection carried from those portions of the oropharynx in which there is partial stagnation of secretions and in which we find large plexuses of veins. Here may be a place of entrance for infectious material which could easily pass through the heart to the pulmonary circulation, if infection took place in this way, which is probably not often the case. The location of abscesses in the lungs might at least lend weight, but the history of most cases will be the reverse. Is it possible that the great number of lung abscesses following tonsillectomy may be caused in this way?

If the contention of Clendenning and others is correct, that these abscesses are caused by the motor driven anesthetic apparatus, it is probable that they are caused by the chilling of the lung tissue by driving cold ether under pressure into the alveoli or even into the tissues. This we know is not true with the apparatus of the same type in which the ether is warmed. While this may be the cause, as many more abscesses have followed tonsil operations since this form of apparatus has been adopted, it is also true that many more tonsil operations are performed now than were done with the old anesthetic methods. Furthermore, we do not now see postoperative pneumonia which was so much feared a few years ago.

Infection carried into the lung by foreign bodies will be found to be the most frequent cause of abscess of the lung and bronchiectasis. That we may have foreign bodies which are either sterile or at least fail to carry any virulent infection to these tissues, is admitted. As most abscesses following foreign bodies that have been *in situ* for some days or weeks, it is possible that pressure necrosis and lack of drainage play an important rôle, as cough is inefficient and ciliary action prevented.

We also believe that abscesses following tonsil and adenoid operations may be called foreign body abscesses, for the reason that small pieces of tissue, blood clots, or fluids may be aspirated and these are likely to be infected or carry infection with them. In the cases in which the tonsils have not been removed, or there has been no other operative procedure in the nose or throat, we could still have infection aspirated as a foreign body, either as pus from the sinuses and teeth, or caseous plugs from the tonsil. The cavitation which takes place in tuberculosis is dissimilar, although injury from small foreign bodies may play a part in the formation of the tubercle.

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When foreign bodies are removed within a few hours after their lodgment, they usually do not cause much damage, and it has been our experience that the larger bodies which more or less completely fill the bronchus are infinitely worse than sharp objects. We have also observed that in cases of infection caused by foreign bodies, even after their removal, the chest is more apt to be involved on the affected side during subsequent colds. My attention was called to this fact by Gengenbach, Kennelly, and Amesse who have followed a number of my patients. It has been suggested by Wasson and others that we may have a specific organism or group of organisms in these cases. At present we are carrying on some work along this line, but it has not progressed far enough yet to draw conclusions. A question which might naturally suggest itself is, What produces the softening of the surrounding tissues? Our attention has been directed to this condition by Lynah and Stewart, as well as the fact that we do not as a rule see a distinct cavity through the bronchoscope.

A point which we have not seen mentioned in the literature on this subject is the apparent distensibility of the bronchi on inspiration, which is not seen to any extent in the normal. Some of these bronchi collapse as if the cartilaginous rings were absent or had lost their resiliency. This condition probably accounts to some extent for the poor drainage and failure to resolve in chronic cases, as these are the only cases in which this condition is found. We may also find stenosis from granulation and connective tissue as suggested by Lynah. Many of these patients show clubbing of the fingers and the oval nail with passive hyperemia, the same as in tuberculosis.

The patients in this series have been aspirated by use of the motor driven aspirating pump or by use of the tube with closed end to prevent injury to the mucosa, as the ordinary tube is apt to do. Yankauer's irrigation method has been employed in only two cases and in one of these on only one occasion.

An attempt to outline cavities with bismuth subcarbonate has not been found to be successful. The bismuth oil of Lynah has not been used. Granulation tissue has been touched with iodine of from two to three per cent. strength, or with silver nitrate, one per cent.

Case I.—L. P., aged thirty-two, tuberculosis with cavity formation for several years. The patient was aspirated and washed on two occasions, the last time being at his request in 1916. This patient died of a cellulitis of the neck a few days after the second bronchoscopy, which was done under a local anesthetic and which may have been largely responsible for the death, as there was a great deal of coughing in spite of the fact that a fourth of a grain of morphine sulphate and one one hundred and fiftieth of a grain of atropine were given. For this reason some of the earlier cases were given a general anesthetic. We find, however, that if the morphine is given early enough, the cough is kept under fairly good control.

Case II.—Miss A. S., aged eight, was seen in August, 1916, and the following history given: Three weeks previously she had aspirated a large buckshot. Since that time she had not been well and had coughed a great deal. On entrance to the hospital she had a temperature of 104.2°. An *x* ray examination showed the bullet in the lower left bronchus with quite a shadow directly above. An attempt to remove the bullet under fluoroscopic bronchoscopy resulted in pushing the body down the bronchus from one eighth to one fourth of an inch. Immediately from the opening of a bronchus superior to this, pus flowed freely into the main bronchus, continuing until from one half to two ounces were aspirated, when it ceased. Further effort at removal was not made. Temperature dropped to 99.2° in four hours and became normal within seventy-two hours. The parents refused to allow a second attempt to be made at removal and one year later the foreign body was coughed up. The parents reported that the child had no further trouble.

Case III.—P. M., male, aged four, was referred by Dr. Geise, of Colorado Springs, in September, 1920, with the following history: About eighteen months previously his parents were awakened by a cry and what they explained as apparently inability to take in air (inspiratory dyspnea). At that time the patient was in fairly good health but underweight for his age. His fingers were clubbed, he coughed, and was restless at night. Tonsils were removed six months ago, but after this trouble was well established. Dr. Geise reported moist râles in base of right lung which also showed shadow in skiagram. The child's grandmother stated that at the time of the accident he was in the habit of chewing gum, and probably went to bed with some in his mouth, which was aspirated and caused the symptom stated above. The patient was bronchoscoped under warm ether and pus was aspirated from right lower bronchus. On the second aspiration ten days later many flakes came away. These were thought to be particles of gum, but they were not examined. They resembled the flakes coming from tissue in paraffinoma. From this time on improvement was steady, although he was bronchoscoped again six weeks later and a small amount of pus aspirated. Within two weeks he was reported doing well and gaining in weight. We have not seen him for three months.

Case IV.—C. V., aged twenty-two years, was referred by U. S. Public Health Service, June, 1920, for bronchiectasis. The patient coughed a great deal, raising in twenty-four hours about three hundred c.c. of sputum which was practically pure pus. He was gassed during service in France. His tonsils had not been removed, and on examination, his nose was found to have a chronic pansinusitis. Radical double frontal and ethmoid operations were performed and both maxillary sinuses washed. He was aspirated three times at six day intervals with pus becoming less each time. The sphenoids were opened on February 10, 1921, and in March there was a marked hemorrhage from left sphenoidal sinus which was checked by packing. Since that time pus increased somewhat and at next aspiration bronchi were washed with normal saline solution. Whether due to the washing or drainage from the sinuses, there was a slight increase in expectoration. He was last aspirated on May 27th, hemorrhage resulting after all pus was removed. The bronchoscope was immediately removed, but another hemorrhage took place twenty-four hours later, since which time only old blood from cavity had been coughed up, the patient having been kept quietly in bed. This patient gained twenty pounds in weight since the first aspiration and felt well despite the hemorrhage.

It will be noted that there was no history of tuberculosis; repeated sputum examinations were negative. The hemorrhage in this case was probably due to slight injury from the tube or from the aspirator. Guineapig inoculation by Dr. Hillkowitz on May 25th with secretion from bronchi revealed no lesion of tuberculosis.

Case V.—L. G., aged twenty-five, was referred by U. S. Public Health Service, in February, 1921, for abscess of lung, situated in the lower right lobe. The history as to cause was negative. Tonsils were hypertrophied and infected. The patient was aspirated at six day intervals, but not washed, five times in all. At the time of the first aspiration, the patient was raising one hundred to one hundred and fifty c.c. of pus in twenty-four hours. This amount was lessened about fifty per cent. and the patient gained seven pounds. Guineapig inoculation proved negative in this case also.

Case VI.—G. C. L., aged twenty-eight, was referred by U. S. Public Health Service on May 20, 1921. This case illustrates how the history of a foreign body may be ignored. The patient had been in the army from May 18, 1918, to July 23, 1920, and was given S. C. D. on "account of chronic bronchitis." History prior to service: Typhoid fever in 1906, measles in 1914, no pneumonia. History during service: On evening of January 1, 1919, was holding pencil point protector in his mouth when he was struck on the back by a comrade. He inhaled the protector, which was about an inch and a half long and made of metal. A severe pain immediately developed in left lower chest with paroxysms of coughing. He went on sick report next morning, told about accident but was not believed. He manifested "acute appendicitis" and was sent to hospital for emergency operation, but a diagnosis of pneumonia was made and no operation performed. He repeated the story of the accident, but no x ray was taken. He was coughing continually and also spitting blood, but was sent back to duty about January 19, 1919. He was readmitted to hospital on January 25, 1919, and a diagnosis of influenza was made. Later measles developed. He was transferred on March 10, 1919, to Base Hospital 103, Dijon, France.

He again repeated his story and was fluoroscoped but no foreign body discovered. He was transferred to various hospitals in France and then sent to the United States, to General Hospital 19, Oteen, N. C. X rays were taken but no foreign body discovered. He stopped telling of aspirating the pencil protector because his story was not credited. He was operated upon on May 8, 1919, for appendicitis, and transferred to General Hospital 21, Colorado. X ray showed foreign body in left lower lobe and the diagnosis was: Nontuberculous, after sixty-seven negative sputum examinations. Transferred to Walter Reed Hospital, Washington, D. C., April 24, 1920. On May 27, 1920, fragments of protector were removed through bronchoscope from left bronchus by Dr. Chevalier Jackson, at Jefferson Hospital. Patient discharged from hospital and army July 23, 1920, much improved. He noticed, however, that every time he contracted a cold it affected the left lung more than right, and he always felt some pain in the left chest on deep breathing. Occasionally he spat up blood streaked material, and almost pure blood when he had a cold. He coughed a great deal during the day and raised about four ounces of sputum in twenty-four hours, but did not cough during the night. Since his discharge, no hospitalization had been necessary. The patient is at present taking vocational training in agriculture.

A physical examination showed the constitutional symptoms to be a cough, with copious, rather foul, thick expectoration, increased by stooping posture or lying with head low. His height was sixty-seven inches, weight at present, 146 pounds, normal 152 pounds. His temperature was 98.6°, pulse 74. His color was poor, general nutrition fair, marked clubbing of fingers; chest about normal in contour with prominent clavicles; heaving apex impulse in fifth interspace nipple line, slight lagging in expansion at left base. Resonance was impaired above second rib right and throughout left, particularly over lower left lobe; breath sound suppressed over entire left lung (suppression marked at base, anteriorly). There were variable coarse râles from base to apex on the left, with bubbling râles after cough over lower radiation; left especially marked internal to angle or scapula with marked increase in whispered voice in latter area. Right lung presented only a few scattered variable râles. Heart was normal in size but apex displaced slightly to left (adhesions); no murmurs. Pulmonic second sound was moderately accentuated. A diagnosis was made of severe chronic bronchitis with bronchiectasis; pleurisy, chronic fibrous, left base. The possibility of tuberculosis was not excluded, but was doubtful in view of sixty-seven negative sputum examinations.

The patient was bronchoscoped on May 27, 1921, and about three ounces of pus aspirated from the left lower lobe. Although the right showed a large lymph node in the skiagram, which was thought to be a foreign body, it was entirely normal.

It was found necessary to remove granulation tissue in these cases. Silver and iodine solutions caused sufficient contraction to give better drainage. The position on the table was semi-Trendelberg or Jackson. In either of these positions pus would at times flow out of the bronchoscope and saved a certain amount of aspiration. Powder blown into bronchi had not produced sufficient shadow to show in skiagram. Catheter would show in cavity, and should curl if cavity was large enough, thus differentiating between abscess and bronchiectasis. The aftertreatment consisted of placing the patient in bed with the foot raised eight to ten inches. Inhalations of compound tincture of benzoin or terebene were used the same as has been done for years in tracheotomy cases.

Metropolitan Building.

Pneumoperitoneum as an Aid in the Diagnosis of Cardiospasm*

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Our knowledge of the cause of the symptom complex commonly called cardiospasm still remains obscure. According to Jackson (1) the term cardiospasm is rather a misnomer since spasm limited solely to the cardia "is exceedingly rare, while spasm of the abdominal esophagus and of the esophagus at the hiatus either separately or together are relatively common." It seems likely that the anatomical relations of the lower esophagus play a considerable rôle in the causation of esophagismus. The original work of Mosher (2), revealed the intimate association of the abdominal esophagus and liver. He stated that "below the diaphragm the esophagus passed through a tunnel of liver"—and added, "I have come to the conclusion that the liver is the chief factor in determining the form and position of the subdiaphragmatic portion of the esophagus." He draws the theoretical conclusion, "that as the chief cause of deformity of the lower end of the esophagus is pressure from the surrounding liver, etc., and this pressure might be relieved by suspending the liver by shortening the round ligament or by advancing the left lobe of the liver and suturing it to the diaphragm if this could be made feasible."

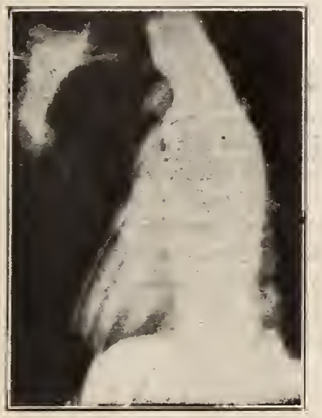

FIG. 1.—Enormously dilated esophagus filled with barium mixture showing complete obstruction at the cardia.

In the study of cardiospasm, x ray examination and esophagoscopy give valuable information concerning the functioning and the lumen of the esophagus. However, if the spasm is due to some pathological process surrounding the subdiaphragmatic portion of the esophagus the diagnosis of the cause is by inference rather than by direct demonstration. In the study of a case of this kind, which came under our observation at the Cincinnati General Hospital, neither the röntgenologist, Dr. Carl Little, nor myself, could by ordinary methods determine the true condition of the abdominal esophagus. We therefore decided that some light might be thrown upon the subject by examining the patient with the aid of pneumoperitoneum. In this we were not disappointed, since the pneumoradiograms obtained revealed the underlying pathological conditions.

CASE.—The patient, a negro, aged twenty-four years, after convalescing from bronchopneumonia was sent to the x ray laboratory on February 16, 1920, for a chest picture, in which Dr. Little noticed a huge mediastinal shadow, which he interpreted as the dilated esophagus. This, if I may coin the word, was a veritable "hydroesophagus" containing fluid previously swallowed by the patient. The ingestion of barium confirmed the diagnosis. On February 16, 1920, stereoscopic x ray plates of the chest showed no evidence of a pathological condition in any part of the lung tissue, but there was shown an enormous dilatation of the esophagus. On February 17, 1920, fluoroscopic and plate examination after the ingestion of barium meal showed an enormous dilatation of the esophagus with complete stricture at the cardia (Fig. 1). The patient regurgitated practically all food and was so weak and emaciated that gastrostomy was promptly performed by Dr. J. L. Ransohoff, on February 19, 1920.

At first despite the ample food intake the patient failed to gain in strength, and remained bedridden for a prolonged period. Food by mouth was usually regurgitated. The Wassermann reaction was negative. Three months after the gastrostomy he was up and about. At this time an esophagoscopy, under ether, was undertaken.

While inserting the esophagoscope it was found that the dilated esophagus was full of decomposed foul smelling food, which had probably collected for weeks. This was cleaned out by means of sponges and the aspirator. Slight ulcerations were found on the anterior wall close to the hiatus, which were probably due to the irritation caused by the stagnated and decomposed material. It was not possible to pass a bougie into the stomach. Owing to the enormous amount of stagnated material it was not possible to examine the esophagus closely. Five weeks after the esophagoscopy the x ray report was, "complete closure just below the diaphragm." Pneumoperitoneum was then decided upon.

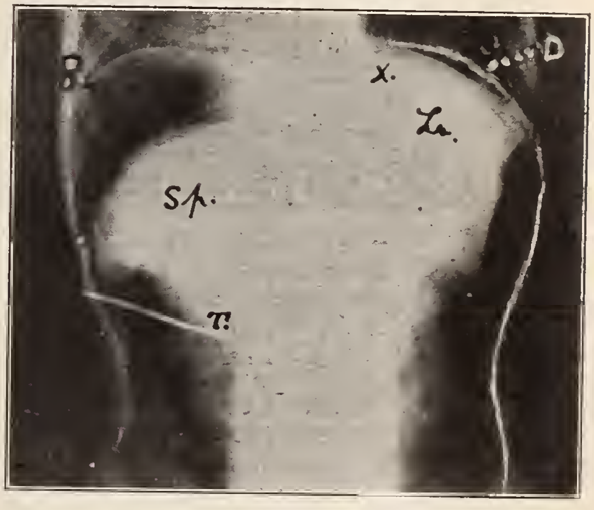

FIG. 2.—Röntgenogram taken after pneumoperitoneum showing adhesions of the internal border and dome of liver to right diaphragm at X; D, right diaphragm; B, left diaphragm; Lr. right lobe of liver; Sp., Spleen; T, rubber tube in stomach. Note wide separation between left diaphragm and spleen in contrast with the slight separation on the right side which was due to the adhesions. Owing to faint outline in reproduction the right diaphragm and the right abdominal wall have been retouched in ink.

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*Read at the fourth annual meeting of the American Bronchoscopic Society, June 1, 1921.

Dr. Little reported as follows: "July 7, 1920. Fluoroscopic and plate examination following the ingestion of barium meal and after injection of oxygen into the abdominal cavity and after the introduction of air into the stomach through the surgical sinus shows gross dilatation with complete stricture of the esophagus, and shows the stomach to be somewhat increased in size. The liver is somewhat enlarged and the inner border is adherent to the right diaphragm. The spleen is normal and the left diaphragm is in normal position. From an x ray viewpoint it is suggested that stricture in esophagus is due to encroachment of liver upon esophagus with the probability of adhesions in this area" (Fig. 2).

Three weeks after the pneumoperitoneum, daily irrigations of the esophageal pouch was begun, and this proved beneficial to the patient. A second esophagoscopy two months after the pneumoperitoneum showed the esophagus still markedly dilated. The mucous membrane, however, was pink and apparently in good condition. Two bougies were passed into the stomach. After returning to the ward the patient vomited a large amount of food which he had put into the stomach. Vomiting of part of food put into stomach continued for four days, after which he began swallowing without regurgitation. The gastrostomy opening was kept patent merely for urgency. The patient felt well and continued gaining. Three weeks after the esophagoscopy, the gastric fistula having closed, the patient was in good condition, while fluoroscopic examination showed a patent cardia.

From the evidence offered by pneumoperitoneum it seemed likely that the symptoms of cardiospasm in this case were due to the adhesions between the diaphragm and the liver encroaching upon the subdiaphragmatic esophagus. Several factors probably led to the marked improvement in this patient. First, the gastrostomy which kept him alive and which placed the esophagus at rest over a prolonged period. Second, the daily alkaline irrigations of the esophagus were beneficial to the inflamed and ulcerated mucosa. Third, after the second esophagostomy and passing the bougies into the stomach, improvement was rapid.

It will be recalled that the patient upon moving experienced a flopping sensation in his abdomen after the introduction of the oxygen. In this connection it is just possible that the pneumoperitoneum may have loosened some of the liver adhesions and this in turn may have freed the esophagus and led to the marked improvement of the patient soon after the abdomen had been inflated. The use of pneumoperitoneum has been limited chiefly to the diagnosis of abdominal and pelvic conditions. So far as I am aware it has not hitherto been employed in the diagnosis of cardiospasm, the symptoms of which are chiefly supradiaphragmatic. In a similar case, should the pneumoröntgenograms reveal an adherent liver, it might be feasible, under anesthesia, to free the adhesions by manipulation through the abdominal wall. The use of oxygen as an inflatant tends to prevent the reforming of adhesions since this gas is not absorbed in less than seven or eight days.

Judging from the experience gained in this case, pneumoperitoneum should be of considerable value in the study of similar obscure cases of cardiospasm. The procedure is practically free from danger (3) and according to Stewart and Alvarez, by inflating with carbon dioxide instead of oxygen or air, the discomfort of the patient is greatly diminished, since the carbon dioxide is absorbed within thirty minutes.

REFERENCES.

1. Jackson, C.: Peroral Endoscopy and Laryngeal Surgery, *Laryngoscope*, St. Louis, 1915, p. 510.
2. Mosher; H. P.: *Transactions Amer. Laryng., Rhino., and Otological Society*, 1920, p. 5.
3. Ruben, I. C.: *American Journal of Röntgenology.*

Hodgkin's Disease in Which Endoscopy Led to Diagnosis*

By LEE M. HURD, M.D., F.A.C.S.,
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Case.—F. G., female, twenty years of age, first consulted me on January 20, 1920, because a throat specialist wished to operate on the septum and some part of the throat to relieve cough. She had had a dry cough for a year and a half which had grown much worse during the past four months, and pain over the left eye and left side of face for the past three months, which usually occurred in the afternoon or evening. There was a moderate nasal discharge, but no impairment of breathing. Adenoids were removed sixteen years ago. There was no sore throat, the teeth and ears were normal, and there was occasional hoarseness. She had lost ten pounds in the past four months. There were no night sweats or fever. Her appetite was poor and she was constipated. She slept well.

Examination of the nose showed a pale mucous membrane, a slight deviation of the septum, and hypertrophied middle turbinate. Larynx and trachea, by laryngoscopic examination, were found normal. The Wassermann reaction was negative; von Pirquet was positive; small gland behind left clavicle. Blood count was 5,200,000 red corpuscles; white blood corpuscles, 16,000; polymorphonuclears, eighty-nine per cent.; small lymphocytes, five per cent.; large lymphocytes, five per cent.; eosinophiles, one per cent. Urine was negative except for a slight trace of albumin.

Under morphine one quarter grain, atropine one one hundredth, and alypin, the bronchoscope was passed down the left bronchus one inch below the carina where there was constriction and congestion. Manipulation about the constriction produced intense coughing which a second dose of one quarter grain of morphine did not control. The blood count on May 2, 1921, was white blood corpuscles, 10,600; polymorphonuclears, seventy-five per cent.; small lymphocytes, twenty per cent.; large lymphocytes, four per cent.; basophiles, one per cent.

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*Read at the fourth annual meeting of the American Bronchoscopic Society, June 1, 1921.

An x ray examination was made by Dr. H. M. Imboden. There was a shadow on the left side which suggested that it arose from the root of the lung, but it did not seem to have any connection whatever with the aorta. A dense shadow was also found superimposed upon the arch of the aorta. This might be due to the same cause as the shadow previously described. The mass projected slightly into the posterior mediastinum, and as it projected into the mediastinum, it seemed quite smooth in outline. This mass pulsated somewhat, but the pulsation was probably transmitted from the aorta. It certainly was not extensive. There were definite changes in the base of the right lung, probably due to pressure from the mass in the left side.

A physical examination was made by Dr. Warren Coleman. The patient looked pale and ill. The heart, throat and teeth showed nothing abnormal. The thyroid was enlarged, especially the right lobe. The heart was negative. There was dullness over the roots of both lungs, and both lower lobes were imperfectly aerated. Both respiratory murmurs were slightly prolonged over the lower lobes. The chest was otherwise negative. An examination of the abdomen showed both recti very rigid, but moved with respiration. Spleen and liver were negative. There was tenderness in both iliac regions, especially on the left, low down. Indefinite resistance was felt deep down in the left iliac region suggesting the possibility of glandular enlargement.

The diagnosis was probable Hodgkin's disease. The gland was removed from behind the left clavicle and submitted to Dr. James Ewing. His report was as follows: "The supraclavicular lymph node shows the changes of an atypical Hodgkin's granuloma. The section shows obliteration of all normal landmarks by irregular new tissue, composed of lymphocytes, many reticulum cells, a few eosinophile cells, much fibrosis, no necrosis. The lesion is of rather long standing, and the node hard and fibrous. The structure is not entirely typical of Hodgkin's granuloma, but it is not a tumor, and is not tubercle or lues, so that by exclusion the diagnosis of Hodgkin's disease is highly probable. There are in addition many of the histological features of Hodgkin's disease."

The patient has been under x ray treatment, the mass in the mediastinum is slightly smaller, and the cough is better; otherwise no perceptible change.

The Clinical Study of the Biliary Secretions Obtained by Nonsurgical Drainage

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The problems of differential diagnosis encountered in the right upper abdominal quadrant far exceed in frequency and difficulty those of the other three quadrants combined. The reason for this is found in the variety and clinical importance of the structures located within this area, which includes the bile passages, with the gallbladder, which has heretofore been considered too much as an isolated entity, a part of the liver and pancreas, and the gastroduodenal zone. Thus the diagnostic uncertainties recognized by all clinicians, both surgical and medical, are easily explained. Fixing our attention especially upon the biliary apparatus, the diagnostic data hitherto available in its study may thus be summarized: clinical history, symptomatology, physical signs, certain collateral laboratory findings and x ray evidence. Now in many cases, these data are notoriously insufficient. In the field of laboratory research there has, until quite recently, been an almost complete absence of any direct information relative to the biliary mechanism, such as is available in the clinical study of the stomach and kidneys.

The x ray study of the biliary mechanism, while admittedly important and occasionally decisive, is, on the whole, disappointing. This is especially true of gallstones, only a relatively small percentage of which can be positively recognized by the x ray. The uncertainty of the positive findings is emphasized in a recent paper by Bassler (1). In a series of his cases in which a positive x ray diagnosis of gallstones was made, the diagnosis was found to be wrong in sixty-eight per cent. When we take into consideration the further fact that one half or more of all gallstones fail to cast a definite shadow, the limitations of x ray diagnosis in this field, even with the best of the technic and with the Potter-Bucky diaphragm, must be painfully obvious.

In a certain group of cases with definite pain and tenderness and recurring chills and fever, no doubt the diagnosis can be made with confidence by means of the other data enumerated. There probably is, however, no group of symptoms indicative, e. g., of cholecystitis, which may not be simulated by adjacent pathology. Such being the facts every clinician must feel the pressing need for additional information. With the discovery by Meltzer (2) that the application of magnesium sulphate, to the duodenum at the entrance of the common duct stimulates an increased flow of bile, and with the subsequent clinical application of this discovery by Lyon (3), it seems to me that a new and important source of information has been added to our clinical study of the biliary apparatus. The clinical importance of the subject is so great that it seems worth while at this time to review the subject in the light of my own experience, with the view of attempting an appraisal of its real value, its limitations and its uncertainties.

Meltzer (2) explained these phenomena, so far as the emptying of the gallbladder is concerned, by formulating his socalled law of contrary innervation, which does not appear at this time to need further elucidation. Oddi's sphincter at the papilla of Vater has been recently restudied by Crohn (4) and Mann (5), fully confirming the existence of an efficient sphincter, the fibres existing not as a definite isolated ring, but scattered through the structures surrounding the papilla. A very valuable study of the function of this sphincter has recently been made by McWhorter (6), who also quotes similar work of Archibald (7) and Mann (8) by operative methods in both human and animal subjects. The efficiency of the sphincter is indicated by the fact that it requires a pressure equal to several hundred millimetres of water to overcome its resistance, leaving no doubt as to its function in controlling the orifice. In fact McWhorter (6) found it difficult to overcome its tonicity as a prospective surgical procedure, by incisions without making the latter so deep that he was afraid of penetrating the entire thickness of the intestinal wall. He further found that the instillation of magnesium sulphate solution, twenty-five per cent., relaxed the sphincter sufficiently greatly to lower the pressure required to overcome its resistance, although it did not cause its complete relaxation. This furnishes important confirmation from a surgeon, of Meltzer's original observation, at least so far as the sphincter is concerned.

In view of all these observations, there can no longer be any doubt as to the validity of the assumption of a sphincteric control of this orifice.

One interesting observation by McWhorter was a lowering of the tonicity of this sphincter by the removal of the gallbladder, indicating the physiological relationship of the sphincter to the gallbladder.

The detrusor muscle of the gallbladder consists of nonstriated fibres scattered through the fibromuscular coat, the function of which, if it has any, must be obvious. It is extremely probable that under normal conditions and with proper stimulation it is capable of at least partially emptying the gallbladder. For what other possible purpose could it be there?

The function of the entire biliary apparatus is probably controlled to a large extent by stimuli derived from the duodenal mucosa, and also very probably from "advance" reflex stimulation from the gastric mucosa. This applies not only to the motor action of the special reservoir known as the gallbladder, but also to the rate of secretion of bile, and consequently the flow of the latter through the ducts. These stimuli may be regarded, at least, in part, as hormones, probably derived mainly from the gastric contents which are carried into the duodenum, and act upon the gallbladder and secreting cells of the liver at that period of digestion when the bile is required. By the law of contrary innervation, if we please so to designate it, Oddi's sphincter, which at least partially blocks the flow of bile when the latter is not needed, relaxes and permits the flow of the latter into the duodenum. Undoubtedly the magnesium sulphate acts in much the same manner when applied as in the clinical method under consideration. The acceleration of the flow of bile in response to this artificial hormone is very marked, as shown by the relatively large amount of C bile obtained after the gallbladder has been emptied, or at least after cessation of the flow of dark bile, or in cases where the gallbladder has been surgically removed, or the cystic duct has been blocked.

From my experience in about a hundred cases, I can fully confirm the statement that if the bulb of the duodenal tube is located in the duodenum, near the papilla of Vater, and a solution of magnesium sulphate injected through it, in a few minutes there will be a free flow of bile into the duodenum which can be easily aspirated for subsequent study. Contrary to the statement of Bruns (quoted by Meltzer (2)), and the observation of Crohn (4), there is usually in our experience a slight flow of bile, probably due to mechanical stimulation preceding the injection of the magnesium sulphate. The quantity of the bile is nearly always very small until a few minutes after instillation of the magnesium sulphate. Following this we find, with many exceptions, yet with striking frequency, a sequence of different types of bile, which Lyon (3) has designated A, B and C bile. The socalled A bile, under normal conditions, is usually rather small in amount, averaging about ten or fifteen c. c., and of a yellowish color. Then follows, in successful cases, the socalled B bile, thicker in consistency and darker in color, varying considerably in health and still more widely in disease, and which it is assumed is made up in whole or in part (probably in part), of the contents of the gallbladder. The quantity of this B bile is much larger, varying in amount from two to four or five ounces. When the supply of this bile is exhausted the bile again becomes thinner and more yellowish in color, and constitutes the socalled C bile, presumably derived from the hepatic ducts and liver, and which is similar in color and consistency of the A bile. The various types of bile are separately collected for chemical, cytological and bacteriological study.

It is perfectly obvious that the value and dependability of any differential diagnostic conclusions which may be drawn from a laboratory study of these different collections of bile rests upon the validity of their assumed sources and their freedom from confusing extraneous material. I wish at this point, however, to emphasize the importance of a laboratory study of the bile obtained directly from the biliary passages regardless of whether it is derived directly from the hepatic ducts or the gallbladder. We will first consider the question of their origin, as this is fundamental, especially in the differentiation of disease of the different parts of the biliary apparatus.

In regard to the A bile, it could scarcely be other, than the contents of the common duct. The darker B bile is, however, the subject of some dispute. At first sight its cystic origin appears conclusive. As experience accumulates, however, certain facts are met, which require explanation. Crohn (4), for instance, in a valuable study, correlated with surgical findings, obtained this dark colored B bile in a case from which the gallbladder had been removed. He had the gallbladder aspirated during operations and found no constant correspondence between the microscopic contents of this aspirated bile and that of the B bile obtained from the duodenum.

Crohn (9) also injected methylene blue into the gallbladder of eight dogs and obtained the stain from only one after introducing magnesium sulphate into the duodenum.

Dunn and Connell (10) report an interesting observation on a case of hepatoduodenostomy in which gallbladder, cystic and common duct had been previously removed. The bile collected in the duodenum came directly from the liver, through the hepatic duct without any possible interposition of a reservoir of any kind. The observations were made through a duodenal fistula. Magnesium sulphate solution introduced into the duodenum, and again into the jejunum thirty-two cm. below the papilla, in each instance produced a characteristic A B C sequence of bile. When introduced into the colon, only clear yellow bile was obtained. Chemical analysis showed that with the deepening color of the bile there was a corresponding slight increase in its magnesium sulphate content, which must have been absorbed by the radicles of the portal vein, and resecreted by the liver with increased bile pigment and salts.

The quantity of magnesium sulphate which did not exceed fifty-five mg. to one hundred c. c. bile, as stated by the authors, was too small to play any important rôle in the specific gravity of the bile samples. The magnesium sulphate estimations were quantitatively made by Prof. G. T. Myers, of the University of Nebraska. Dunn and Connell (10) found the specific gravity increasing from 1,015 to to 1,040. This great increase must therefore be due to increased quantities of bile pigments, salts, etc., which it is possible may have been excited by the small quantity of magnesium sulphate reaching the liver.

Bassler, Luckett and Lutz (11), in a recent communication, present their conclusions, based on medical and surgical study of clinical material at their disposal, the exact number of cases not being mentioned. This paper was apparently written for the purpose of controverting the grounds upon which Lyon based his conclusion that the B bile is derived from the gallbladder. These reasons, as set forth by Lyon (12), are briefly: First, the acceptance of Meltzer's law of contrary innervation; second, increased color and viscosity of the bile; third, the difficulty of accounting for the dark colored bile on other ground; fourth, entire absence of dark B bile in ten or more cholecystectomized cases; fifth, clinical improvement following biweekly drainage of a group of nonoperated cases of cholecystitis and biliary stasis. These authors do not accept any of these grounds as valid, and conclude that the B bile cannot always be derived from the gallbladder." They conclude that the increased specific gravity of the B bile is dependent upon its increased content of magnesium sulphate, which they determine by a rough precipitation method. This is directly at variance with the conclusion of Dunn and Connell cited above. With these conflicting results before us for consideration we must wait for further work to clear up the question.

These authors obtained the A. B. C. sequence of bile, even more strikingly, by using dilute solution of hydrochloric acid instead of magnesium sulphate which has no bearing on the clinical value of the test, although discrediting the specificity of magnesium sulphate solutions. This does not seem a priori unplausible, because hydrochloric acid, normally present in the chyme, might easily be one of nature's hormones for stimulating the biliary mechanism.

Their claim that the sudden transition to dark bile is due to rapid oxidation, in certain of their cases without gallbladder, is suggestive and entitled to serious consideration, but must await further confirmation. This point will be referred to again.

In its bearing on the question of the origin of the B bile, by far the most important contribution is that of Whipple (13). In twenty-four out of twenty-seven cases of gallbladder disease coming to operation, he made the duodenal injection of magnesium sulphate according to the Lyon technic. In only two of these twenty-four cases did he get the characteristic B bile. In these two cases Whipple found on operation chronic cholecystitis with a patent cystic duct in each case. In the remaining twenty-two cases no bile was obtained in three because of obstruction of the common duct. In the remaining nineteen cases only yellow bile corresponding to the A and C types was obtained. The characteristic dark or B bile was not obtained in any one of these cases which is certainly a remarkable fact if the phenomenon observed by Dunn and Connell and others is not rare. In eleven of these nineteen cases the cystic duct was found entirely closed. In the remaining eight cases there was absence of gallbladder or gross gallbladder pathology in the way of thickened wall, adhesions or many stones, which it can be plausibly assumed would, and probably did, prevent the contractility of the gallbladder. It may be added that this author and investigator accepts, apparently without question, the cystic origin of the B bile saying that "if, after magnesium sulphate instillation there occurs a rapid flow of thick, dark green bile, the cystic duct may be considered patent and the walls of the gallbladder contractile." Whipple emphasizes the value of the preoperative laboratory study of bile obtained by this method as giving the surgeon advance information concerning the pathology of the biliary apparatus.

Smithies (14) considers the B bile of gallbladder origin on the basis of quantity, sudden gush of flow, color and presence of columnar epithelium, which characteristics, he says, are not found in the absence of the gallbladder. He believes that in no case of gallbladder disease should operation be performed without a preoperative lavage of the duodenum, with magnesium sulphate and further, that this should be included in the postoperative management in all cases.

He quotes Sachs (15), Lesner (16) and Friedenwald (17) to the effect that incompletely anesthetized individuals, and on dogs whose duodena have been segregated local introduction into the duodenum of hypertonic solutions of magnesium sulphate, with subsequent early withdrawal produces a definite, visible dilatation of the viscus, contraction of the gallbladder and of the bile ducts, with outpouring of bladder and liver bile.

Friedenwald and Morrison (18) consider the study of bile obtained by duodenal intubation as of prime importance and do not consider a search for focal infections complete without it. As a therapeutic measure in catarrhal jaundice and chronic cholecystitis, it has proved very valuable in their hands.

Einhorn (19) does not accept the Meltzer-Lyon contention that the dark colored bile is derived from the gallbladder. In his experience the *transition* from light to dark and dark back to light was *very gradual,* and is due, in his opinion, to the increased quantity of the magnesium or other salt absorbed into the portal stream and resecreted by the liver. He found this dark colored bile in patients from whom the gallbladder had been removed.

If dark colored B bile is obtained in the absence of a gallbladder, three possible explanations suggest themselves; first, an accessory reservoir caused by a duct ectasia; second, a sudden change in the liver secretion due to stimulation by magnesium sulphate or other chemical used; third, a rapid increase in oxidation as suggested by Bassler. In regard to the first explanation it may help us to consider the mode of production of the dark colored cystic bile the character of which is admitted by all observers.

Since the classical work of Kemp (20) on the absorption from the gallbladder mucosa, presented to the Royal Society, it has been well known that the latter entirely unlike the urinary bladder, absorbs fluids readily and rapidly. This, of course, tends to concentrate the bile and along with this concentration other changes, especially an alteration and deepening of the color, ensue. These changes are due in part, as Kemp has shown, to the admixture with the cystic bile of large quantities of mucus which undoubtedly produce important chemical modifications in the cystic bile. His conclusions are: First, that the mucus of the gallbladder is not merely a secretion destined to lubricate the interior of that organ and protect it from the irritation of its other contents, but is an essential integral portion of the cystic bile; second, that the gallbladder is not merely a reservoir for the bile, but an organ highly endowed with organic functions, and that the primary secretion of the liver is converted into cystic bile, mainly through the agency of its mucous membrane.

It is really difficult to understand how the well known characteristics of cystic bile could be duplicated elsewhere along the biliary tract, for instance, by a duct ectasia, which might conceivably constitute a bile receptacle of considerable dimensions in the absence of the gallbladder. The highly complex mucosa of the bladder with its trabeculated surface points to a function equally complex, and which could scarcely be assumed by a dilated duct.

It may, I think, be fairly assumed that the lining membrane of a duct ectasia could not duplicate the function of the gallbladder mucosa, either in the way of absorption of fluid or in the special secretion of mucus, although the bile might be darkened by long continued retention.

The second explanation presupposes a rapid increase in the quantity of pigment and bile salts secreted, giving rise to bile darker in color and higher in specific gravity. That such transition may occur seems established by the observation of Dunn and Connell in the complete absence of gallbladder, cystic and common duct. Such bile, it would seem, could only be produced by a somewhat gradual transition instead of the sudden change which is found in a large proportion of cases of apparently successful gallbladder drainage. Third, the assumption by Bassler of a *sudden* oxidation process which produces the transition from yellow to dark bile is, so far as I know, entirely unsupported by any known facts.

In the way of negative evidence as to the production of dark bile, in the absence of a functioning gallbladder, the twenty-two cases of Whipple, the ten or more cases of Lyon, referred to above, and one of my own, in all of which only light colored bile was obtained, certainly constitute strong proof that it is at the most a rare phenomenon.

Taking into account all the available evidence, together with my own observations, I have no hesitation in affirming that the dark colored B bile, obtained by the Meltzer-Lyon method, is usually obtained from the gallbladder. Some of my reasons for reaching this conclusion may be stated as follows: The suddenness of transition from A bile to B bile is best explained by the sudden emptying of the gallbladder receptacle into the current of bile flowing from the liver into the duodenum. This is, in most instances, instantaneous. When the bile is collected in a vertical tube during the transition, the line of demarkation is absolutely sharp and definite; no intermediate layer can be detected. On the other hand, if the transition is gradual, as observed by Einhorn, and as has been frequently observed in my own case, it does not disprove the gallbladder origin of the dark bile, as the gallbladder may slowly contract, slowly extruding its contents into the common duct, producing a gradual transition.

It has frequently happened in our experience that a typical A B C sequence will be obtained at one time, and at another time, only clear yellow A or C type obtained. It seems more reasonable to explain this by variability of the contractility of the gallbladder than by a failure of the magnesium sulphate to produce an effect upon the liver at one time which it fails to produce at another. The technic is identical and absorption and liver stimulation should be and probably are the same.

In a few cases in which we have repeatedly carried out this method tentatively for therapeutic purposes it has been commonly observed that with successive treatments the B bile becomes lighter in color, containing less and less formed pathological constituents, a phenomenon which can scarcely be explained otherwise than by assuming less and less static conditions in the gallbladder, which has presumably been partially or completely emptied by preceding treatments. These changes include diminishing numbers of leucocytes, fewer bacteria, and a diminution or disappearance of cholesterin crystals.

Microscopic study of stomach and duodenal contents and segregated A B and C bile specimens often furnishes proof, almost if not entirely conclusive, of the gallbladder origin of the B bile by revealing the existence in it of bacterial, cytological or crystalline forms not found elsewhere. As previously shown both the relaxation of oddi's sphincter and the contraction of the gallbladder musculature under stimulation by the Meltzer-Lyon procedure have been demonstrated.

In this connection it may be remarked that the failure to get B bile in some cases in which the surgeon can produce it by manual pressure may be explained by a poorly functioning gallbladder musculature or a manual pressure far in excess of the force of its physiological contractility; and the effect of air and anesthesia in surgical observations may inhibit the contractility of the gallbladder musculature. Admitting the difficulty and at times the impossibility of determining the precise portion of the biliary tract from which a segregated specimen of bile has been derived, what observations of clinical value can be made from the bile derived from the entire biliary tract or any part of it. As already indicated the gallbladder has been too much considered as a separate entity, instead of a highly specialized part of the biliary tract. The chemical and microscopical study of the bile from the entire tract must take into account the admixture of extraneous matter, which obviously can only be derived from the stomach or duodenum, and precaution should always be taken to avoid errors from these sources. The stomach can be reasonably well cleansed but cannot be sterilized, nor can its secretions be stopped during the observation, nor their admixture with duodenal contents be prevented when the latter are aspirated.

To minimize the error from admixture of gastric and duodenal contents the former should be carefully studied chemically and microscopically as the tube is passing through the stomach and the latter after it has entered the duodenum, each viscus then being thoroughly irrigated. In cases of hyperchlorhydria in which a large quantity of hydrochloric acid is being secreted and passed on into the duodenum, the bile undergoes a chemical change on coming into contact with it, which makes it turbid. This change must not be mistaken for pathological conditions. The chemical and microscopic study of the bile is undoubtedly of important clinical value. Microscopically no significance should be attached to an occasional leucocyte, epithelial cell, or cholesterin crystal, although the latter obviously can not occur except in static bile. Where these formed elements are present in excess and are not found, at least of the same type, in the stomach and duodenum, they assume a clinical importance which varies with their character and number. The bacterial contents of the bile should be studied by both cultures and freshly made smears, the latter being quite as important, since the number and morphology may be such as to demonstrate at once an important infection. The positive bacteriological identification can, of course, only be made by proper cultural methods, although the cytological and bacteriological content determined by the fresh smear will often go far toward settling the questions involved, and give quantitative information which a culture may fail to show.

The importance of the gallbladder and bile ducts as the site of a fecal infection can not be too strongly emphasized and I agree with Friedenwald (17) that a search for focal infection can not be considered complete without a study of the bile obtained by nonsurgical drainage of the biliary apparatus.

The clinical method of obtaining the biliary secretions for chemical and microscopical study is beset with difficulties which may be slight or insurmountable. In about five per cent. of the patients, we entirely failed to get the tube into the duodenum on the first trial. In some of them we subsequently succeeded. The time required varied from half an hour to three hours, and in a few extreme cases to several hours. We use the fluoroscope constantly to determine when the tube is in proper position. By revealing the curves which the tube makes, the fluoroscope constitutes the most positive demonstration of the location of the tube.

In approximately seventy per cent. of our observations a dark colored or B bile was obtained by either an abrupt or gradual transition. In the remaining thirty per cent. it rarely ever happened that the light yellow bile underwent no changes, excepting in those cases in which the gallbladder had been removed or there was good reason to suspect that it was not functioning because of obstructed ducts or other causes. As already stated, both the gradual transition and the slighter grades of darkening are probably due to a slow extrusion of bile from the gallbladder. With regard to the cases showing sudden transitions there is no reasonable doubt.

The conclusions already set forth, based largely on personal observations of patients and inspection of biliary secretions submitted to me by clinical assistants, have been confirmed to a most remarkable degree by the accurate work of Whipple, already referred to, in which every case, twenty-four in number, was checked by painstaking operative and bacteriological studies.

The clinical importance of infections of the biliary passages, leaving entirely out of sight the particular segment of the tract involved, can not be too strongly emphasized. Whipple's views on the value of these observations as a routine preoperative measure, have already been referred to. It seems, however, more than probable that there is in all cases a more or less prolonged presurgical stage, which if recognized, as it usually can be by these methods, gives the patient and clinician an opportunity to use all available means for preventing its further progress with the production of either a surgical condition in the gallbladder or widespread pathology in the liver. In regard to the latter, it seems quite probable, in the light of our present knowledge, that a large group of cases of hepatic cirrhosis may arise from infections of the biliary passages. Adami (21) is of the opinion that Laennec's cirrhosis is of an infective and not purely toxic nature, and favors the view that toxic agents, such as alcohol, are operative because of the depressed cell resistance due to low grade infection, possibly with members of the colon group, excessive numbers of which may find their way into the portal circulation in gastrointestinal disease. He also says that angiocholitis and biliary retention are among the causes of cirrhosis.

In view of the facts thus far established, and their wide clinical application, it would seem that these clinical methods in spite of their difficulties and cumbersomeness, are not only worth while, but supply information of the highest importance, which cannot be otherwise obtained. It is probably too soon to attempt to define precisely their limitations or possibilities, but it is not too much to say that their scientific application will lessen the incidence of gallbladder, bile duct and hepatic disease.

The references will appear in the author's reprints.

Weight Reduction and Its Remarkable Effect on High Blood Pressure

By ROBERT HUGH ROSE, B.A., M.D.,
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I have noticed a rapid fall in blood pressure during the process of weight reduction through dietetic adjustment. This has occurred almost uniformly and it is fair to conclude that weight reduction through regulation of diet is one of the chief therapeutic measures to be used in the treatment of high blood pressure. In fact, if Bright's disease, focal infections, and conditions in which other treatment is clearly indicated are excluded, diet and treatment of the intestinal tract seem almost certain to reduce the high blood pressure. Furthermore, it is not difficult to maintain the blood pressure at a lower point by normalizing the diet after it has been once reduced in this way.

Whether obesity is considered an entity or not, it is associated with many symptoms which are relieved as weight decreases. It matters little to the patient whether these are symptoms of obesity or of its complications. The most frequent symptoms are palpitation of the heart, dyspnea on exertion, pains in the knees, ankles, feet and other joints, difficult walking and impairment of activity. Arteriosclerosis, edema of the ankles, albuminuria, gout, myositis, neuritis, lordosis, flat feet, intestinal toxemia, vertigo, eczema intertrigo and hypothyroidism are complications.

Within the first forty-eight hours after a weight reduction diet has been started a marked relief is felt by the patient from the shortness of breath and palpitation of the heart. Walking becomes easier because of this relief to the heart and the breathing. It is not long before stiffness and painful joints begin to improve and they are frequently cured entirely.

An initial drop in the systolic blood pressure of twenty points in the first five to seven days is not unusual. It is easy to understand what this means to an embarrassed heart which has been working against a blood pressure fifty to a hundred points above normal. The edema rapidly disappears. The albumin in the urine likewise disappears when it is due to congestion of the kidneys. After the blood pressure has reached a point sufficiently low entirely to relieve the embarrassed heart, edema and albuminuria from congestion of the kidneys seem to be completely cured. When headache is due to high blood pressure or the resultant kidney congestion, it also yields to this treatment. Vertigo and fainting, which were present in two of the cases here reported, were cured. Intermittent pulse is another symptom which improves.

Gouty manifestations are greatly benefited by the low diet used for weight reduction unless the mistake is made of using too much meat and highly seasoned food. A weight reduction diet should be low in carbohydrates and fats. The amount of protein allowed should be moderate. The drinking of large quantities of water, thereby increasing elimination, is of great advantage while weight is being lost.

This is particularly necessary in the gouty cases. A recent popular book, of which several hundred thousand copies are said to have been sold, recommends an unbalanced, unscientific diet.

Whatever may be the causes of diabetes, overeating is certainly a factor. As a prophylactic measure against diabetes, dietetic restriction for weight reduction or for the prevention of weight increase in those inclined toward obesity is undoubtedly highly important. It is difficult to estimate its full value.

When sufficient weight has been lost, backache resulting from a compensatory forward convexity of the lumbar vertebræ in those of large abdominal girth is cured. The arches of the feet being relieved of the excessive weight which they are called upon to support, symptoms of flatfoot or weak foot are done away with.

Vertigo and fainting have disappeared during the treatment of these cases. In one or two it might have been due to the relief of an accompanying intestinal toxemia, because elimination by way of the intestinal tract was given considerable attention.

The following cases were taken from those which led to the conclusions which are presented in this article. Some of these patients had bad teeth or other focal infections and many suffered from intestinal toxemia, but the weight reduction diet was the treatment given to all and, I am convinced, caused the decrease in blood pressure. Other treatment used was according to indication in each case and varied considerably. I am sure that all will agree with me in the opinion that catharsis alone could not have been responsible for the uniform results here shown, nor could it have reduced blood pressure so many points.

Case I.—Mrs. J. C., first seen January 18, 1919. Symptoms: Severe headaches, shortness of breath, swelling of the ankles, and backache. Physical examination: Weight, 180.5 pounds; blood pressure, diastolic 110, systolic 204; urine, slight trace of albumin. Treatment: Weight reduction diet containing very small amount of meat, one thirtieth of a grain of strychnine, three times a day, and cathartics. January 25th, weight 178 pounds and 2 ounces, blood pressure, diastolic 100, systolic 178; February 8th, weight 177 pounds and 4 ounces, blood pressure, diastolic 92, systolic 170; February 15th, weight 177 pounds and 5 ounces, blood pressure, diastolic 92, systolic 170; March 1st, weight 168 pounds and 3 ounces, blood pressure, diastolic 98, systolic 158; March 22nd, weight 172 pounds, blood pressure, diastolic 92, systolic 162. During this time most of the symptoms disappeared, headaches, shortness of breath and albuminuria, although the patient was by no means cured, for there were complications not traceable to overeating, and an unfavorable family history. The teeth were in bad condition and the patient, feeling practically well, discontinued treatment and went to a dentist for pyorrhea. Almost two years later, in the early part of December, 1920, she returned with a small trace of albumin and headaches. The weight and blood pressure had remained down, weight 158 pounds, blood pressure, diastolic 98, systolic 165. Aftertreatment directed to increase of elimination through the intestinal tract, albumin and headaches disappeared and the patient maintained her improvement. Almost one year later, August 9, 1921, the patient came to the office. Examination of urine showed no albumin and the blood pressure was, diastolic 90, systolic 156.

Result.—Blood pressure dropped, diastolic ten points, systolic twenty-six points the first week. Two months later weight was eight pounds, blood pressure, diastolic eighteen points and systolic forty-two points lower. Two and one half years later, the diastolic blood pressure was down twenty points and the systolic was down forty-eight points; swelling of ankles, albuminuria, dyspnea, backache and headache were gone.

Case II.—Mrs. C. H. V., first visit April 13, 1917. Symptoms: Patient complained of rheumatism in back and knees, headache, swelling of ankles, palpitation and shortness of breath. Physical examination: Weight 240 pounds; blood pressure, systolic 190, pulse irregular, some swelling of the ankles. Treatment: The patient was placed on a weight reduction diet and seen from time to time during the following year; the weight gradually dropping until on October 22, 1917, it was 198 pounds and 10 ounces. The blood pressure was systolic 140. May 4, 1918, the weight was 190 pounds and 8 ounces, the blood pressure, diastolic 85, systolic 170. Much relief was obtained from rheumatic symptoms and activity in walking and getting about greatly increased. May 2, 1921, about four years since the first visit, the patient returned for further treatment, weight having risen to 197 pounds, which was, however, 43 pounds less than when first seen. The diet was resumed and on July 22nd the weight was 184 and a half pounds, the blood pressure, diastolic 84, systolic 154.

Result.—After four years weight is fifty-six pounds lower. Systolic blood pressure is thirty-six points lower than when first seen. The breathing is much easier. Backache, rheumatism and edema are gone. Walking has become possible.

Case III.—Mrs. J. L. S., first visit on March 15, 1920. Symptoms: Headaches, dizziness, fainting (has fainted several times on the street), backache, pain in the left hip, pain in the left lower quadrant of the abdomen, pain in right arm and elbow, shortness of breath on climbing stairs, disturbed sleep. Examination showed weight 201 pounds, blood pressure, diastolic 90, systolic 150. Heart negative, some pyorrhea, leucorrhea, tenderness over the sigmoid, x ray showed unrotated colon, cecum in the midline. Cecal stasis continued beyond forty-eight hours. Treatment consisted of weight reduction diet and irrigations of the colon in addition to advice as to having other conditions treated. The following is the subsequent history: March 29th: weight 193 pounds, blood pressure 134; patient slept better; pain in left lower quadrant relieved, pain in back less constant; pain in arm better, no fainting but still some dizziness. April 30th: weight 186 pounds and 8 ounces. May 20th: weight 180 pounds and 12 ounces, blood pressure, diastolic 88, systolic 120. Patient climbed stairs more readily, no dizziness, no fainting, all symptoms had about disappeared. Six months later, on November 24th, weight was 171 pounds, blood pressure 126. Patient said she was so well that she did not need a physician any longer. At the first visit patient said she had been treating for fifteen years without benefit but had been persuaded by her family to try once more.

Result.—In eight months' time weight was reduced thirty pounds, systolic blood pressure twenty-four points, and all symptoms were cured.

Case IV.—Mrs. A. D., first visit March 21, 1921. Symptoms: Dyspnea on exertion, headaches, palpitation, pain in the knees and elbows, numbness of arms and swelling of the ankles. The patient had increased in weight twelve pounds in a year. She was a heavy drinker of tea. Examination showed weight to be 172 pounds and 8 ounces, blood pressure, diastolic 104, systolic 170 pulse 96, marked tremor, goitre and scar where a part of the thyroid had been removed. March 26th: weight 169 pounds and 8 ounces, blood pressure 150, pulse 72. April 2nd: weight 168 pounds, blood pressure 140. April 11th: weight 166 pounds and 12 ounces, blood pressure 140. In the meantime the headaches, swelling of the ankles, shortness of breath, pain in the knees, and numbness of the arms had disappeared. The patient complained of heartburn. A test breakfast was given with the following results: free hydrochloric acid 40, total acidity 76. After the use of alkalies the heartburn ceased. May 2nd: all symptoms were relieved, weight was 168 pounds, blood pressure, diastolic 88, systolic 118.

Result.—There was a remarkable drop in blood pressure, systolic fifty-two points from 170, diastolic sixteen points from one hundred and four in forty days. This was in no way accompanied by any unfavorable symptoms, such as dizziness and weakness. In fact, the patient was improving in every way and feeling better all the time. The pulse fell from 96 to 72 in five days. Edema and dyspnea were cured during treatment.

Case V.—Mr. C. H. V. gave a history of frequent attacks of rheumatism, also had glaucoma, pain in the right eye and headache. Patient was unable to read except the largest print; family was told by oculists nothing could be done for his eyes. Pilocarpine drops were being used. Had an abscess near eye tooth on right side which he said did not trouble him, though it had discharged intermittently for years. At the time of the first visit in June, 1920, he was having an acute attack of rheumatism. Meat, butter, the latter being used excessively, were restricted in his dietary, colchicine and aspirin were given by mouth, and sodium carbonate enemata were given. This attack was quickly controlled. The abscess over the right eye tooth proved to be large, with thickwalled sac. Three days after its removal the pain in the eye and head disappeared and did not return. The general acuteness of vision improved some and the tension of the eyeball was lessened. The blood pressure when first taken, July 26, 1920 (this being the date of the first visit to my office, after the acute attack of rheumatism was cured) was systolic 190. It dropped in ten months to 160, ranging between 154 and 170. At this time the diastolic blood pressure ranged between 106 and 110. Though the patient was not overweight, I put him on a daily diet of one quart of milk and all the fruit he desired to take. The blood pressure dropped to diastolic 98, systolic 156. I asked him to follow this diet one day a week thereafter. Less than a month later, on June 15, 1921, the blood pressure was 96/148. On August 24th it was 96/156. There had continued to be an improvement in the clearness of vision.

Result.—Patient on restricted diet for a number of months. Blood pressure dropped from 190 to 160, systolic, and diastolic was little changed. No attention was paid to the weight in this case. The patient was finally placed on a very low diet for effect on blood pressure and diastolic dropped ten points, systolic ten points more.

CASE VI.—Miss B. M. K., first seen on April 22, 1916. Patient complained of shortness of breath, dizziness and fainting, and bad taste in the mouth in the morning. Physical examination showed slight tenderness in the right upper quadrant of the abdomen, weight 184 pounds and 15 ounces, blood pressure 150. X ray showed evidence of adhesions between the colon and gallbladder with stasis in the cecum and ileum. Treatment consisted of colonic irrigations, weight reduction diet, fels bovis and magnesia usta. Weight, April 29th, 182 pounds; May 27th, 172 pounds; June 23rd, 164 pounds and blood pressure 115. All fainting disappeared after the first week of treatment and dizziness by the end of a month.

Result.—Weight was reduced thirty pounds in three months and systolic blood pressure thirty-five points in two months.

CASE VII.—Mrs. H. W. P., first seen July 25, 1916. At this time the weight was 180 pounds and 4 ounces. Blood pressure was diastolic 110, systolic 160. Before seeing the patient she had been taking intestinal irrigations which were not discontinued. In addition she was placed upon a weight reduction diet. On July 31st, weight was 178 pounds and 4 ounces, blood pressure, diastolic 95, systolic 145. On August 8th, weight was 174 pounds and 4 ounces, blood pressure, diastolic 85, systolic 130.

Result.—In two weeks the weight was reduced six pounds, the diastolic blood pressure twenty-five points and the systolic blood pressure thirty points.

CASE VIII.—Mrs. E. M. S., first visit September 11, 1916. Patient complained of shortness of breath and some symptoms referable to the stomach. Examination showed, height five feet five and a half inches, weight 179 pounds. Blood pressure, diastolic 110, systolic 180. Pulse was intermittent. There was nothing of importance in the examination of the urine. September 15th, weight was 176 pounds and 8 ounces; September 30th, weight was 174 pounds and 6 ounces; October 7th, weight 172 pounds and 10 ounces; November 11th, 166 pounds and 8 ounces; December 5th, 165 pounds and 8 ounces; January 10th, 164 pounds and 12 ounces. On December 2nd the blood pressure was systolic 150.

Result.—In about three months' time the weight was reduced fifteen pounds and the blood pressure thirty points.

CASE IX.—Mrs. R. L., first visit February 6, 1919. Patient complained of dizziness with frequent fainting, pain over the heart and dyspnea. Examination showed a blood pressure of 240. Unfortunately the weight was not taken at this visit but the diet which was chosen was a weight reduction diet and I have records of the loss of weight from March 12th to June 23d. The examination on March 12th disclosed that the blood pressure had dropped to 210, the weight was then 155 pounds and 8 ounces. On June 23d the weight was 145 pounds and 12 ounces and the systolic blood pressure 190.

Result.—In a little over four months' time more than ten pounds in weight was lost and the blood pressure was reduced fifty points. The patient's blood pressure had remained at 190 when she was seen six months later.

CASE X.—Mrs. J. S. This patient had been under my care for a number of years, and in all this time she ran a high blood pressure and suffered from severe and persistent headaches. Her head was never comfortable. Previous treatment had given considerable relief but left much to be desired. On April 25, 1921, the blood pressure was diastolic 124, systolic 190; weight 142 pounds and 6 ounces. Patient was seen frequently and given injections of lutein for the relief of headaches and associated nervous symptoms. On May 12th the blood pressure was diastolic 114, systolic 164, weight 143 pounds and 12 ounces. The patient was placed upon a diet designed to reduce her slowly, though she was not much overweight, to ascertain whether this would further reduce her blood pressure. By June 6th her weight was 141 pounds and 8 ounces, her blood pressure, diastolic 114, systolic 144; June 27th weight was 140 pounds, blood pressure, diastolic 110, systolic 152; August 1st, weight was 138 pounds and 5 ounces, blood pressure, diastolic 110, systolic 154.

Result.—A persistent case which had yielded partially to treatment and had already obtained a drop in the blood pressure diastolic ten points and systolic twenty-six points, when the patient was placed upon a diet which caused a loss of only five pounds in two months, gave a still further loss in the blood pressure diastolic four points, systolic ten points. The patient felt so much better that she stopped coming to the office, otherwise I am convinced that the diet would have reduced the diastolic blood pressure ten or twenty points more.

CONCLUSIONS.

Weight reduction through dietetic adjustment causes improvement in several important symptoms either due to or associated with obesity.

1. One of the most uniformly noticed and the most important of these is the reduction of blood pressure. The amount of this reduction is much greater than could be obtained by the use of drugs.

2. Excepting Bright's disease, focal infection and incurable diseases, this method gives promise of

being a therapeutic measure which can be relied upon to reduce blood pressure.

3. Cases amenable to this method of treatment maintain the low blood pressure if the diet is normalized at the conclusion of the reduction.

4. There are some symptoms which seem to be dependent upon the increased blood pressure and which are relieved as the blood pressure falls. These are shortness of breath, palpitation, edema of the lower extremities, and albuminuria.

5. A drop of fifteen to twenty points in the systolic blood pressure during the first week of the treatment is quite common for those starting with a blood pressure around 200. A reduction of fifty points during the course of treatment is to be expected in such cases. These same patients starting with a diastolic blood pressure between 110 and 120 will generally conclude the treatment with a diastolic blood pressure between 90 and 100. For those whose blood pressure is not above systolic 150 at the beginning a drop to between 120 and 130 can be expected.

6. One of the worst forms of headache is due to high blood pressure. It is very successfully relieved during this method of treatment.

40 East Forty-first Street.

Gallstone Colic: Its Cause and Treatment

By HENRY HALPERT, M. D.,

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The commonly accepted cause of gallstone formation is bacterial infection. The theory of this bacterial origin was first put forth by Bernard Naunyn (1) some thirty years ago, and although later studies and clinical observations have considerably modified his views, the present acceptance may be summed up by saying that gallstones are probably caused by a hematogenous streptococcal infection of the gallbladder and its ducts, this infection being accompanied by an altered cholesterin blood content. Naunyn himself concluded that cholesterin was not a specific secretion from the liver, but rather that the cholesterin which aided in gallstone formation had its origin in the epithelial cells of the walls of the gallbladder and ducts, which had degenerated and been thrown off as a result of the inflammation caused by the presence of the bacteria. This inflammation he called "lithogenous catarrh."

Thorkild Rovsing (2), who some years ago studied the etiology of gallstones very thoroughly, believes that the chief cause of biliary calculus formation is the concentration and inspissation of the bile during the course of fevers or of pregnancy. Under these conditions calcium salts and, later on, bile salts are precipitated, and thus a nucleus for the accumulation of cholesterin crystals is formed. Chemical analysis of the stones when in an early state of formation tends to support this view, and it is also confirmed by the large number of bile cultures which have proved to be sterile. Rovsing's idea is that the infection follows the formation of calculi instead of preceding it, probably being caused by the irritation from the stone acting as a foreign body.

More recently one of our own countrymen, Edwin Henes, Jr., of New York (3), has presented studies and clinical observations upon which he bases the assertion that gallstones are not dependent for their formation upon a primary infection of the gallbladder, for we see many cases of cholelithiasis in which the removed gallbladders show no evidence of the slightest amount of inflammation. It is, however, in his conclusions regarding the close relationship between pregnancy and gallstones, and between typhoid fever and cholelithiasis, that I am especially interested. "One of the characteristics of pregnancy is a progressive increase in the amount of cholesterol in the blood. At term a definite hypercholesterinemia is found and it persists for some time after the birth of the child. In typhoid fever, as soon as convalescence sets in, we note a decided rise above the normal in the cholesterol content of the blood. The influence of fever is marked, and always reduces the amount of cholesterol found in the blood. The higher the fever, the more marked is this influence."

To the general practitioner, the correct diagnosis of gallbladder lesions is by no means as easy as a hasty perusal of the textbooks would lead one to believe. When he is confronted with an acute attack of what he believes to be gallstone colic, it will be necessary for him to make a minute study of the patient's history and diathesis, with a careful consideration of all predisposing factors, before he can feel assured that he is following the right course in his management of the case.

The patients who suffer from gallstone colic may be divided into six classes, as follows:

1. Those in whom the presence of gallstones cannot be demonstrated, and who give no symptoms referable to the gallbladder.

2. Patients who present no symptoms other than chronic indigestion.

3. Those suffering from recurrent attacks of severe colicky pain, usually in the right hypochondrium, radiating upward and toward the back. The attacks are due to the presence of a stone in the cystic duct; when this is dislodged, the pain ceases and in the interval between attacks, the patient is perfectly well.

4. Those patients who suffer from recurrent acute attacks of colic, but unlike those of Class 3 are not free from symptoms during the intervals; having intermediate attacks of sudden digestive disturbance, sometimes almost as distressing as those caused by the impaction of the stones.

5. Patients who have recurrent acute colicky attacks, and in the intervals between suffer continuously from socalled dyspepsia and general discomfort in the alimentary tract.

6. Elderly individuals who do not have colic, but instead give a history of chills unaccompanied by fever. These chills represent the occurrence of colic in younger subjects.

With the exception of the last group all of these patients give us a history of severe pain, invariably coming on in the evening, or during the early part of the night. We have it on the authority of John F. Erdmann that in the case of a patient giving a history of going to bed perfectly well and being awakened before three in the morning with a terrific pain in the upper abdomen, a diagnosis of cholelithiasis can be made without an examination.

Leaving out the patients in Classes 1 and 2 in whom we can find no primary evidence locating the trouble in the biliary tract, the remaining patients are almost sure to give a history of what Erdmann terms "the prodromal stage of gallbladder disease," a sense of weight or of foreign body presence after eating, with attacks of discomfort following the ingestion of certain articles of diet. The cramp or colic which was the immediate cause of the consultation will be described as being located in the upper right quadrant, sometimes without extension, or again radiating to the lumbar region, beneath the scapula; sometimes even as far as the left shoulder and on both sides of the neck. If the stone is in the cystic duct, the colicky pain will be reported as extending upward across the midline under the left breast—constituting the socalled pseudoangina.

Ninety per cent. of these cases occur in women, and with many of them the first attack of pain occurs during pregnancy or following delivery. This selective period in life is explained—according to Erdmann (4)—by the increase of cholesterin in the blood at this time.

The immediate cause of gallstone colic is usually some indiscretion in eating. Many patients will complain that they are never able to eat certain foods—fatty food especially—without distress, but in most cases a specific article or a certain meal will be held responsible for the present attack. Fried or acid foods are especially prone to stir up trouble. The mechanism of the production of gallstone colic may be explained as follows:

We know that the secretion of the stomach is acid, while that of the duodenum is alkaline Cholecystitis and cholelithiasis, produced experimentally in dogs, have demonstrated an apparent increase in the amount of hydrochloric acid in the gastric secretion. Bile itself seems to have no influence whatever on the gastric secretions, but regurgitation of the duodenal contents with the bile of course lowers the acidity of the gastric contents because of the addition of the alkaline duodenal secretions. If, however, the duodenal secretion should become acid, it has been experimentally demonstrated that a spasm of the pylorus will result so that connection between the stomach and duodenum will be cut off, effectually blocking the passage of the stomach contents into the intestines. Similar observations have been made clinically. Therefore it appears that, following the ingestion of an unusually large meal or of a certain kind of food, the digestion of which requires more than ordinary activity on the part of the stomach, a large quantity of secretion is poured out by the gastric glands; and as a result an unusually large amount of acid passes through the pylorus into the duodenum. The alkali normally present in the duodenum may not, in this emergency, be sufficient to neutralize all the acid pouring in with the stomach content. It will be necessary to reinforce the alkaline strength of the duodenum by an overflow of bile from the gallbladder, the bile being also an alkaline substance, though not, as I have shown above, to the same degree as the duodenal fluid. This puts an added strain upon the gallbladder, and the greater the amount or indigestible character of the food taken into the stomach, the heavier will this additional burden fall upon the gallbladder. Therefore, given that that organ is already crippled by disease—inflammation, or the presence of stones even without active inflammation—we can easily understand the occurrence of colic after dietary indiscretions. Fried or acid foods by increasing gastric acidity will act in the same way.

This, I believe, is the true explanation of gallbladder colic, and it also explains why these patients always have their attacks during the evening or early part of the night. At these hours the stomach is naturally empty, and no food being on hand to absorb the acid gastric secretion it passes directly into the duodenum. The alkali in the duodenum being insufficient to neutralize this acid, the gallbladder will be called upon to reinforce the duodenal supply, and the revolt of the overworked gallbladder brings on the attack of colic.

Considering the appropriate treatment, in the light of this theory, we see at once that our efforts must be directed toward relief and reinforcement of the gallbladder. Diet is, of course, the first and greatest consideration. The food taken must be such as can be easily assimilated, and all fried or acid substances must be rigorously excluded. Tobacco and alcohol must always be abandoned. Small meals, taken at frequent intervals, four or even five times a day, will serve better than three larger ones. The patient must be prevented from becoming constipated, and the urine should be watched lest it become scanty and show an acid reaction. Drinking plenty of water and care observed that the skin excretes freely and actively at all times, are prime essentials in every case.

The medical attendant should aim to quiet the gallbladder, and lessen the peristalsis as much as possible. The administration of alkaline saline waters, and frequent small meals with plenty of green vegetables and fruit, will tend to increase the flow of bile. Plain drinking water alone, if taken frequently in considerable quantity, is of great help in keeping the bile thin, and preventing its stagnation. Alkalies in hot water both before and after meals should be taken regularly.

For the immediate relief of acute biliary colic opiates are usually necessary and absolute rest, with hot external applications, must be instituted. A hypodermic injection of morphine, with or without atropine, a suppository of opium and belladonna, or the latter with codeine, will be beneficial (5). Later such patients should receive a large dose of bicarbonate of soda, two to four teaspoonfuls, each night at bedtime. A little belladonna at the beginning of treatment will be of assistance in preventing spasm.

The references will appear in the author's reprints.

Dangers of Operations for Rectal Fistula

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DANGERS TO BE AVOIDED.

The sphincter may generally be cut once, especially in the median line, without danger of incontinence, but always divide as little as possible. Never divide the sphincter twice at the same operation or without informing the patient that some incontinence is sure to result. The condition of the patient's bowels, as regards the number and character of movements, must always be considered. A sphincter that acts admirably for one formed movement daily may be totally ineffectual in a case of periodical constipation and diarrhea. Division of the sphincter may cause some incontinence even in a robust man, and dilatation in a delicate woman may leave some permanent paralysis. In fistula cases the sphincters are weak at best and should not be incised or stretched any more than is absolutely necessary. The tendency to incontinence after division is found chiefly in horseshoe and rectolabial varieties, and those old cases where the whole anal region is riddled with openings, but it is in these same cases that the surgeon has an opportunity to demonstrate his resources and ingenuity.

In all fistulæ that extend above the internal sphincter, that muscle usually must be divided with at least a temporary incontinence. A permanent paralysis results if the sphincter is cut several times. Where the tracts extend above the internal opening in the bowel the extensions must be treated as a diverticulum. Sometimes the operator, fearing hemorrhage, will incise only to the internal opening and trust to inflammatory adhesion of the branch. Such treatment is risky.

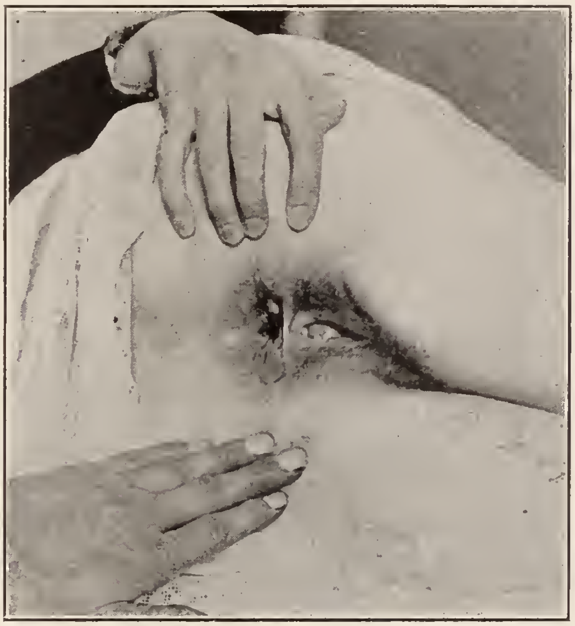

FIG. 1.—Relaxed anal outlet. The divided ends of the sphincter are shown by the pits in the skin on either side of the anus. Note the relaxed vaginal outlet although this woman had never been pregnant.

The branches running under the bowel are of two varieties. One kind extends along beneath the mucous membrane and does not bleed much when cut. The other runs deeper under the muscular coat and even into the perirectal tissues. In these there may be considerable hemorrhage. Many sinuses run under the skin from the bowel to the buttock or scrotum, and these may be laid open without interfering with the sphincters.

Where there are several fistulous tracts (in old cases) the patient's reparative powers are often weak, and it is better to do two small operations than to tax the recuperative power with one extensive one. If more than one internal opening is found they should be incised into a common tract. Diverticula should be dissected out and treated as the main tract, unless there is grave danger of incontinence resulting or of injuring the perineum in the case of women.

If the wound appears healthy but refuses to heal, and if there is no sinus to account for the sluggishness, turn your attention to the general system. If there is evidence of pus burrowing or the formation of a pocket, it should be immediately incised.

FECAL INCONTINENCE.

Fecal incontinence is perhaps the greatest calamity that can follow a rectal operation and one for which the operator is seldom forgiven by the patient. It may also result from injury to the lumbar spine, from disease within the rectum or from traumatic impairment of the contractile power of the sphincter. The loss of fecal control may be complete or only partial. In transverse myelitis it may be mistaken by the patient for diarrhea. A temporary incontinence is sometimes associated with the severe prostration of acute or chronic diseases, such as typhoid fever, cholera, pneumonia and tuberculosis. Incontinence in any of these conditions may be followed by impaction of the rectum because of the loss of tactile sensation of the rectum and the lessened secretion of mucus to lubricate the fecal mass. Incontinence of feces associated with incontinence of urine is a symptom of Jacksonian epilepsy.

The most frequent traumatic causes of incontinence of feces are operation for rectal fistula and hemorrhoids and rupture of the rectovaginal septum by childbirth. Tuttle says, "This condition has become a nightmare to the profession and a stumbling block to every layman suffering from fistula. It is the shibboleth of the charlatan by which he frightens the sufferer away from the regular surgeon and induces him to be content with palliative treatment rather than submit to an operation." Incontinence does not occur anything like as frequently as is generally supposed. It is quite unusual to have more than temporary incontinence unless extensive burrowing or multiple fistulous openings exist. Incontinence may follow dilatation of the sphincter but only if there is some underlying spinal or nervous disease. Oblique, irregular or jagged incision of the sphincter, even though single, may result in such a vicious union of muscle ends that incontinence results. Transverse cutting of the sphincter is not likely to produce incontinence. The integrity of both sphincters is absolutely necessary for the voluntary control of the anus. If the muscle is cut squarely across and the ends united again so as not materially to increase the muscle length there will be good control, but if a wide band of scar intervenes between the severed sphincter ends the muscle will not sufficiently contract to thoroughly close the anus (Fig. 1). Oblique incision of the sphincter allows the divided ends to slide upon one another until the internal fibres of one end unites with only the external fibres of the other end and thus very much lengthens the muscle and is frequently followed by incontinence. When the sinus of a fistula passes through the body of the external sphincter muscle an incision severs only the lower fibres. These may be left to close by granulations. But if the entire muscle is divided and the wound edges retract there is always some incontinence. If the sphincter is cut more than once incontinence is almost sure to occur. Sometimes following childbirth the perineum is restored but the anal sphincter is not united and incontinence results.

From four to six weeks after the sphincter has been severed it retracts, though to a variable degree. Sometimes the muscle ends are still bound together and the tear only enlarges the circle slightly. In other instances, the ends are widely separated and the muscle which is thick and short makes but a shallow arc behind the anus, with a deep dimple in the skin of the posterior raphe behind the location of the muscle. A smooth glazed depression of the skin or sometimes puckered pits mark the location of the ends of the sphincter (Fig. 1). Thus the ability of the patient to retain feces is not an index of the depth of the rent in the muscle but rather of the extent of separation of the ends of the fibres. If the cicatrix binds the ends firmly together an efficient sphincter may still obtain. This approximation is what we hope to attain by a plastic operation in the less fortunate individuals who apply for help. The individual can usually retain formed feces satisfactorily, but as soon as the discharge is at all liquid incontinence occurs. The result is that the patient limits his diet and uses drugs to maintain a degree of constipation which soon interferes with proper alimentation. Intestinal gases also escape and the unpleasant odor forces him from society and he soon becomes melancholy, thus adding another chain of complaints. If the mucosa prolapses a rectal tenesmus appears. In many of these patients a nervous diarrhea develops, excited by the least rumbling of intestinal gases. The whole complex of symptoms tends to reduce the patient's physical well being.

30 North Michigan Avenue.

Some Points in the Diagnosis of Carcinoma of the Rectum

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There is no disease in which correct diagnosis is of greater importance than carcinoma of the rectum. This is not only because of the nature of the disease, but for the additional reason that the differential diagnosis in the cases in which it is of the greatest practical value lies frequently between two diseases, one of which is benign and ends in recovery, and the other malignant, often terminating fatally despite all that science and skill can do. These two conditions are again and again mistaken for each other, even by careful surgeons and internists, or a diagnosis of rectal cancer is made which comes too late to be of much value to the patient.

We believe this is not due so much to carelessness as to certain fallacies which have crept into the minds of physicians concerning cancer of the rectum. Many men assume that to sustain a diagnosis of rectal cancer, the patient must be of middle age or over, who presents a palpable tumor in the rectum, suffers from intractable constipation, sharp pain, and frequent bleeding. Moreover, he looks cachectic, and gives a history of a great loss of weight. It is true that such a group of symptoms may be present late in the disease, but nothing can be more misleading than the assumption that all of them must be in evidence in a suspected case to sustain such a diagnosis. Not only is this a mistaken idea but it is not uncommon to meet what appears on the surface to be the opposite of this picture. Numerous cases occur at thirty or before, in persons in whom no gross tumor can be made out, who are not constipated, suffer little or no pain, have lost no weight and show no outward sign of ill health. Moreover, there might have been no bleeding from the rectum up to the time of the examination, it might have been so slight as to escape notice, or it might occur in a person accustomed to occasional bleeding. In place of a sizeable tumor we may find an ulcer, and far from being constipated, the patient may complain of diarrhea. But from this we need not assume that there is no evidence at this time from which a presumptive diagnosis of rectal cancer can be made; careful examination will disclose symptoms which when properly interpreted are strongly suggestive of the true diagnosis, especially as they are often supported by corroborative findings as we go along.

To enable one to obtain data for such an investigation it is necessary to analyze the findings as they are brought out in the a, history; b, physical examination, and c, laboratory examination.

HISTORY.

In taking the history we must eliminate irrelevant material and make straight for points which have real value when elicited. These are onset and duration of the disease and nature of the complaint, such as pain, altered bowel function, unsatisfactory stools, disturbances of gastric and intestinal function, pathological discharges, and other unusual symptoms which may require examination.

In considering onset and duration of the complaint, we know, of course, that sudden onset and short duration point toward innocent trouble in proportion as gradual beginning and chronic course are ear marks of a more serious disturbance. But what is more significant than this is the circumstance, that in innocent rectal trouble the patient is comparatively free from symptoms in the intervals between his attacks, while in malignancy there are no periods of remission. Trouble having once started the tendency is to progressive increase both in frequency and severity of the symptoms. To illustrate, the person bleeding from hemorrhoids may be perfectly comfortable for months at the time, until something occurs to excite a recurrence; but the patient who has rectal hemorrhages due to a carcinoma will not be free from symptoms at any time but must expect his distress to become more acute with the duration of his illness.

Pain.—It is generally stated that pain is not an essential sign of carcinoma of the rectum, but this depends largely upon the nature of the growth, its location and stage of the disease. Many rectal tumors grow slowly but there are some in which there is an early tendency to encroach upon the neighboring structures, and in these there are a variety of symptoms referable to the urinary function in males, marked subjective pelvic disturbances in both sexes, distressing bearing down pains, boring backaches, etc. A growth low down in the anal canal causes early and acute suffering, higher up the symptoms are less sharp, come on later, and are likely to be such as grow out of interference with passage of gas or stool, while midway (the widest part of the rectum) pain is negligible until late in the disease, when changes due to destruction of tissue will dominate the picture. Situated in the sigmoid, abdominal symptoms become more and more prominent and there are subjective and objective signs referable to the lower left side of the abdomen.

Altered bowel function.—Constipation and diarrhea, which are markedly persistent or progressive, are significant symptoms, the former not to the same extent as the latter, because constipation is relative and a common condition in many people who consider themselves otherwise well, while diarrhea is a definite change from the normal and always associated with some degree of ill health. On the other hand, constipation is an earlier symptom of malignancy, diarrhea being the result of conditions found only late in the disease.

Unsatisfactory stools.—This consists of a feeling following defecation, as though the bowel did not empty completely, forcing the patient to return to stool repeatedly. His centre receives a correct stimulus of something more remaining in the bowel, but he just naturally cannot dislodge it. This is a suggestive symptom but by no means pathognomonic, because it may be found in invagination of the sigmoid into the rectum, prolapse of the bowel, pedunculated polyp, and occasionally in large pendant hemorrhoids. Disturbances of gastric or intestinal functions, grouped under the name of indigestion, are like constipation a common symptom in many persons who have no organic disease, but when they occur coincidentally with the onset of rectal complaints they should be valued accordingly. Their presence in such cases favors a presumption of serious trouble as they are not an ordinary accompaniment of innocent rectal disease.

Pathological discharges.—There are a number of points in connection with this symptom which deserve consideration. In nonmalignant conditions, as, for example, hemorrhoids, bleeding occurs nearly always when there is an increase in intraabdominal pressure, as in attempts at stool, and rarely at other times; in carcinoma it may occur at stool for the same reason, but often independently, from the erosion of a bloodvessel. In some of our cases of carcinoma the first intimation the patients had of trouble was when they found their clothes saturated with blood on arising in the morning. There is a misapprehension about the significance of the kind of blood lost which may lead to erroneous conclusions. It is said to be clotted and dark in carcinoma and fluid and red in nonmalignant conditions which simulate it. This is not to be accepted without qualification, as the color does not depend upon the nature of the lesion, but the point from which the bleeding takes place and the length of time the blood has been retained. Hence, while it is true that bleeding from piles is generally bright red, we must remember that a similar condition may occur in carcinoma implanted low down.

PHYSICAL EXAMINATION.

This consists of: a, Direct examination of the parts by digital palpation and inspection; b, indirect examination through adjacent organs or areas, such as vaginal and abdominal examinations; c, laboratory findings, x ray and sections of tissue.

In direct examination the most valuable means of diagnosis is palpation with the finger accustomed to the feel of both normal and abnormal tissues and structures. We are fortunate if we can bring our fingers in contact with a suspected area for it discloses evidence not obtainable in any other way, and it enables us to feel practically the entire anatomical rectum by putting the patient in a suitable position. We repeat, that it is a mistake to suppose that to establish a diagnosis of carcinoma, it is essential to locate a tumor. Adenocarcinoma, the most common type of rectal cancer, may begin in what is to all intents and purposes an ordinary ulcer, which only later in the disease manifests characteristics of malignancy. Much has been said of the enlargement of the rectal and pelvic glands, but to us their rôle does not seem so important because changes in them are made out only with difficulty and they are at best merely evidences of infection which give no clue to its nature.

Inspection may be accomplished by the use of any kind of a light to which one has become accustomed, but as a means of diagnosis it must always remain secondary to palpation; appearances are deceptive and objects which are totally different often bear a close resemblance to each other. As a method it is inferior to palpation because for one thing it is impossible to recognize by the eye alone physical characteristics which distinguish innocent from malignant conditions. Often, too, the free bleeding obscures clear vision and puts a further limit to the investigation.

Indirect examination is carried out in both sexes upon the abdomen, in females *per vagina*. Palpation of the abdominal wall discloses tumors, masses, tender points, enlargement of the viscera, etc., findings which are peculiar to malignancy rather than to simple rectal diseases. Pelvis examination *per vagina* is indispensable in such conditions because the suspected growth may be extrarectal and for the additional reason that there is an advantage in being able to palpate with two fingers in place of one, a method usually not applicable to rectal examinations except under anesthesia. The character of any suspected mass may be further checked up by introducing one finger into the rectum the other into the vagina.

LABORATORY EXAMINATION.

In the lesions of the rectum proper röntgenological examination is not essential, because given a suitable position the entire organ is within reach of the examining finger and may also be inspected by direct vision. But in a certain number of persons proper sigmoidoscopy is impossible, and in order to enable one to differentiate organic obstructions of the gut from spasm or adhesions competent x ray examination offers the only solution.

Section of a piece of suspected tissue is opposed by some on the well known ground that it may disseminate cancer cells into the blood or lymph circulation and spread the disease. It is really not needed in the diagnosis of cancer of the rectum except as confirmatory proof in the doubtful cases in which one cannot make up his mind from the clinical findings alone whether he is dealing with malignancy or not. In those the patient will have to take his chances on a biopsy in an attempt to confirm or refute the diagnosis in an effort to decide issues upon which his happiness depends so largely.

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Perforated Gastric and Duodenal Ulcer

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Perforation of a gastric or duodenal ulcer is one of the gravest emergencies in abdominal surgery. Peritonitis is the inevitable sequence, unless the condition is checked by operation. In general, the subject is not only of extreme importance to the surgeon, but one concerning which the last word has not been said. It is evident from a casual reading of the literature that the operative technic of repair of the ulcer varies widely.

To approach and decide the question from a study of statistics is of slight value on account of the common failure to note the social status of the patient, the type of hospital, public or private in which the patient was operated on, and chiefly, the omission to classify the patient according to the time or number of hours elapsing before operation was performed. In the main, statistical analyses prove that if an operation is performed early, the mortality decreases, a dictum so well accepted and believed that its demonstration is not necessary. Moreover, it is now futile, with the general acceptance of the wisdom of operation in all instances of perforated ulcer, to prove that surgery is the sole means of treatment.

I have operated on twenty-six patients suffering from either perforated gastric or duodenal ulcer. The question of perforation should be considered as a special topic because neither the general subject of ulcer has been sufficiently elucidated, nor has the operative treatment been well established. Indeed, the mechanism of perforation is still debatable.

The diagnosis is paramount. Care, discrimination and close questioning are essential in order to elicit a history of chronic ulcer. The value of a detailed and correct history is inestimable. If the patient has been studied by an internist or a gastroenterologist, in a detailed and exhaustive manner, where röntgen examination and gastric analysis have been made, and the diagnosis established the correlation of the acute symptoms with the original diagnosis is simple. If the internist is not at hand, the surgeon must question the patient concerning the existence of persistent or chronic gastric symptoms. It is difficult, as a rule, to obtain a classical history. Hunger pain, a characteristic symptom is important, if described. Hematemesis or melena are significant points in the history. Occasionally, none of these symptoms being present, the patient merely complains of vague dyspepsia. Again, as the symptoms of chronic gastric ulcer often recur with a peculiar periodicity, there may appear intervals of freedom from all symptoms. These free intervals are likely to mislead. Perforation in a patient who furnishes absolutely no previous history of gastric or duodenal ulcer is not unusual. Indeed, it is so distinctive, that I have come to believe that there exists a type of ulcer peculiar in its tendency to perforation. The absence of pain during the evolution of an ulcer, especially, when the excavation is deepening toward the peritoneal cavity, is remarkable. Yet it is well known that an ulcerating pyloric carcinoma may, at a later stage, manifest no pain. If an ulcer extends outward toward the peritoneal coat it does not always follow that pain ensues. Of course, the patient often gives a detailed account of gastric or duodenal ulcer symptoms. In these instances the actual acute abdominal symptoms with the past history are easily correlated. But in most instances the patient is so seriously ill and depressed that a careful questioning for the variable symptoms of ulcer is difficult, if not impossible.

Perforation vividly calls the attention of the patient to a condition of extreme importance. If we assume that many untreated ulcers become carcinomatous, we might, with a certain stretch of the imagination, believe the perforation to have a beneficial import. But, the complications and dangers of perforation are too great.

The onset of perforation is sudden and ushered in with severe and agonizing abdominal pain. The pain may occur while the patient is walking or at work. The pain is so intense that he cries aloud. The face rapidly becomes pinched, anxious and covered with cold perspiration. The patient holds his hands to the abdomen for relief. Shock rapidly supervenes. The body is maintained as though held in a vise. The legs are flexed. The temperature is slightly elevated. The pulse rate is moderately accelerated and has a wiry and snappy quality. There may be nausea and sometimes immediate vomiting. Abdominal rigidity takes place at once and is extremely pronounced. The muscles are contracted to the utmost—boardlike. (It is possible that the extravasated acid secretion is a factor in inciting this intense rigidity.) Other symptoms are tenderness in the epigastrium accentuated at a spot an inch above and to the right of the umbilicus. Usually, slight dullness is found in the upper right quadrant immediately below the costal margin and dullness in the right flank. Tenderness over McBurney's point is extremely misleading. Obliteration of liver dullness, due to the presence of free air in the peritoneal cavity, is occasionally seen and of great diagnostic import.

Because the symptoms rapidly evolve, the foregoing description is the typical picture seen within the first few hours. Later, the classical symptoms of diffuse peritonitis develop and dominate. To summarize, one may say the cardinal symptoms are: the sudden onset, intense excruciating pain, extreme boardlike muscular rigidity, areas of tympany over the liver, or obliteration of liver dullness and an area of dullness on percussion, immediately below the right costal border.

The most common erroneous diagnosis is acute perforative appendicitis. Its exclusion is extremely important. At a late stage of the disease, when the symptoms are general and the local signs have vanished, the differential diagnosis is practically impossible. The initial symptoms of perforated ulcer are far more intense than those of appendiceal perforation. There is one cardinal differential point—the symptoms of perforation develop more rapidly than those of acute appendicitis. It is seldom in acute appendicitis, that general muscular rigidity develops before the end of twenty-four hours. In perforated ulcer rigidity is usually bilateral while in appendicitis rigidity is, at first, unilateral. Also, the degree of muscular rigidity differs widely. In perforated gastric or duodenal ulcer, it involves the entire abdominal musculature. In appendicitis, on the contrary, rigidity, save in the perforative type, is moderate, a tenseness—and, in the beginning, unilateral and localized. Admittedly, there are instances of appendicitis in which perforation occurs in less than twenty-four hours. Though these types of fulminant appendicitis must be considered, their rarity tends to neutralize the diagnostic error. Appendicitis, in the beginning, causes a local peritonitis; whereas, perforated ulcer produces a rapidly spreading peritonitis. Pain in appendicitis which appears primarily, as a rule, in the region of the umbilicus, generally radiates rapidly to the right lower quadrant. Tenderness becomes localized at a precise point. The diagnostic error is ascribable to the frequent occurrence of pain in the right lower quadrant in perforated gastric or duodenal ulcer, a symptom readily explained by the downward flow of the exudate and extravasation along the right dorsal gutter.

Dullness is an important differential point. Unfortunately, it does not always exist. There is, however, another extremely significant sign. I refer to an area of localized tympany over the liver in the parasternal line, between the superior and inferior borders of the liver. It is rarely larger in extent than the palm of one's hand, and is readily elicited by simple percussion. Having found this on numerous occasions, I believe that great reliance may be placed on it in the differential diagnosis. The mechanism of its production is not clear. At operation one usually finds a pool of fluid in the region of the pylorus, beneath the liver. It is possible that the free air escaping from this pool passes up to the dome of the diaphragm, where it is imprisoned by the falciform ligament of the liver. This sign is never found in acute appendicitis. A small area of dullness immediately below the right costal border speaks strongly for perforated gastric or duodenal ulcer.

Acute cholecystitis is a more patent diagnosis. Pain is intermittent and colicky in nature, eructations are frequent, the muscular rigidity is not so extreme and intestinal distention occurs rapidly and early. Pain radiates, as a rule, to the right scapula or shoulder. The distended gallbladder, lying under the costal border, may be felt on deep respiration. Bile pigment in the urine is significant. The occurrence of jaundice, or at least, an icteroid tint of the conjunctivæ is of corroborative value. The history of chronic indigestion or previous attacks is material.

PANCREATITIS.

Acute hemorrhagic pancreatitis mimics perforation closely. If the perforation is associated with general peritonitis, the differential diagnosis becomes extremely difficult. Both conditions have in common, severe epigastric pain, marked tenderness, sudden onset and intense peritoneal reaction. Pancreatitis, however, is characterized by extreme intestinal distention; whereas, in perforated ulcer, the abdomen is somewhat flat until the development of diffuse peritonitis. Obliteration of liver dullness does not occur in acute hemorrhagic pancreatitis. To summarize: In acute hemorrhagic pancreatitis, distention is greater, cyanosis of the face more distinctive and the temperature somewhat higher. Tenderness exists in the median line immediately above the umbilicus. The occurrence of boardlike rigidity is rare. Liver dullness remains intact.

INTESTINAL OBSTRUCTION.

Acute intestinal obstruction of the jejunum or upper ileum produces a clinical picture often difficult to diagnose and one obscure in its manner of expression. The initial shock is extreme. Boardlike rigidity at the onset is absent. There is no obliteration of liver dullness nor evidence of fluid in the flanks. The temperature is generally subnormal. Vomiting is a dominant symptom. In acute intestinal obstruction, fever is generally absent in the beginning. Rigidity is seldom present. Moreover, the history usually reports the nonpassage of flatus. Since acute intestinal obstruction is commonly erroneously diagnosed, it is well to remember that obstruction of the upper intestine is an unusual type. The common causes are gallstones or enterolith, impacted in the intestinal lumen, retroperitoneal hernia in the fossa of Treitz and strangulation by a band or Meckel's diverticulum. In the ultimate analysis, the symptoms of perforated ulcer simulate those of intestinal obstruction, the differential diagnosis lies between peritonitis and obstruction. The difficulty is more likely to arise when the perforation takes place slowly or when infection involves solely the central abdominal compartment. The latter possibility is favored by the tendency of the omentum to create adhesions. Peritonitis, slowly developing and remaining unrecognized, proves the elusive point in the diagnosis.

Acute intestinal obstruction as a sequel of appendicectomy is vividly suggested by the history of the previous operation. Obstruction is not so prone to produce rigidity as perforated ulcer. Yet, if the obstruction is caused by a band, attached to the parietal peritoneum, muscular rigidity of an extreme degree may occur, despite the absence of infection. This point is important in the differential diagnosis. An elevation of temperature and increased leucocyte count total and differential, are also valuable aids.

CARCINOMA.

Perforation of a carcinomatous ulcer is somewhat uncommon. I have operated on two instances. The symptoms are ushered in with great shock. Extreme prostration and excruciating pain confined to the epigastrium are characteristic. Rigidity is extreme. The diagnosis is, as a rule, evident. In my two personal cases I was able to make the correct preoperative diagnosis. Both patients were emaciated and cachectic. On the anterior surface of the chest and abdomen were seen small, red, raised papules, which are so often noted in the terminal stage of carcinoma. The treatment, naturally, is futile. Exploration discloses a large sized cancer with central destruction. It is impossible, technically, to close the opening since sutures cannot be securely introduced. Death is inevitable.

Embolism of the superior mesenteric artery or vein may produce symptoms resembling perforated ulcer. A perforated ulcer, coming to operation at a late stage, for example, at the end of the first or second day, presents, as a rule, all the symptoms of embolism, save the occurrence of melena. Since the patient is so seriously ill, a clear history cannot be obtained. The operation becomes exploratory in nature, with the diagnosis one mainly of probabilities.

DUODENAL OR GASTRIC ULCER.

Although from a practical viewpoint, it is somewhat futile to discriminate between the symptoms of perforation of duodenal and of gastric ulcer, there are several differential points at hand. They relate chiefly to the previous history. The actual physical signs and symptoms, evident at the time of operation are, as a rule, identical. The symptoms of perforation of duodenal ulcer may appear with startling suddenness. Many patients, particularly young men, previous to the onset of perforation, complain of no ulcer symptoms. In fact, it is common to obtain this negative history. It would seem reasonable to assume that there exists a distinctive type of ulcer—the perforative—which grants immunity from the usual symptoms. On the other hand, these ulcers, when closely examined at operation, are found to possess a margin, excessively indurated, which indicates indubitably, that the lesion has existed for some time. Yet, certain patients, if minutely questioned as to evidence of dyspepsia, will reveal facts which demonstrate that the ulcer has at some previous time, caused symptoms. But since stomach symptoms are common to so many conditions and possess a similarity, it is difficult, from a mere record of the subjective symptoms, to establish a diagnosis of duodenal ulcer. The essential point for the clinician to remember is that the symptoms may not be of sufficient moment or seriousness to cause the patient to seek the advice of a physician for their control or cure. This point is vital in the diagnosis of perforation. Hence, the preceding history is generally valueless in coming to a diagnostic conclusion.

An accurate diagnosis makes for speed in the operation, since the surgeon can proceed at once to attack the lesion, by planning the incision directly over the duodenum or stomach. If the incision is in the median line, considerable difficulty will be met in applying the sutures to the duodenum or pylorus. These structures are situated at times, at a considerable distance from the median line. Besides, through an incision directly over the duodenum gauze may be more effectively packed against the ulcer.

The surgeon in making his decision must preserve a judicial attitude, notwithstanding the need of haste. In order to diagnose and to decide the question of operation, he must carefully weigh the import of each diagnostic finding. The decision results from a nice balancing and estimation of apparently trifling points.

If a patient is operated on within a few hours after perforation, practically no exudate is found, especially if the perforation is small. Air is present in almost every instance. Indeed, the presence of air in the peritoneal cavity leads one to the belief that it, perhaps, is the cardinal element in the production of the concomitant shock and severe pain, for it is strange that a perforation, usually so small as hardly to admit the tip of one's finger, should produce shock so severe and pain so excruciating. The presence of air in the peritoneal cavity, undoubtedly, excites extreme rigidity. Diffusing rapidly throughout the entire peritoneal cavity and acting, most likely, as a foreign body or element, it incites the abdominal muscles to contraction in the same manner as pus or blood. The rigidity involves the entire abdominal musculature, shock is evidenced by cold extremities, feeble pulse and subnormal temperature. Though this theory, of the origin of shock in perforation of a duodenal ulcer is entirely conjectural, it is evident that the condition may, with some warrant, be ascribed to air, because in patients operated upon by me, but a few hours following perforation, no appreciable peritonitis or exudate was discovered, though rigidity, pain and the signs of shock were distinctly noted. In these instances, air was present in the peritoneal cavity, as evidenced by its sudden escape upon division of the pariteal peritoneum.

These patients are prone to do badly under narcosis. The anesthetist, as a rule, experiences considerable difficulty. The face becomes cyanotic and the respiration labored. This is likely to persist throughout the operation despite the care and skill of the anesthetist. A possible explanation lies in the extreme contraction of the abdominal muscles, combined with an undue elevation of the diaphragm, from air in the peritoneal cavity.

An ulcer, situated along the lesser curvature or on the posterior surface, may perforate into the lesser sac. The extravasated fluid in the lesser sac, upon reaching a certain pressure, tends to enter the greater peritoneal cavity, through the foramen of Winslow. Hence, the ultimate result is the same though the perforation took place on the anterior wall of the pylorus or duodenum. But, the foramen of Winslow, from previous inflammation, may be closed. Under these circumstances the fluid, collecting in the lesser sac, forms an extremely tense swelling. The symptoms are somewhat different from those of an ulcer rupturing into the general peritoneal cavity.

The onset of perforation of an ulcer of the posterior wall of the stomach is characterized by the occurrence of excruciating pain in the back. The intensity of the pain is ascribed to the involvement and distention of the lesser omental sac. In my personal cases, this characteristic pain was not present. Indeed, the slow leakage from a perforated ulcer in this region is prone to lead to the formation of a subphrenic abscess. The great danger is the difficulty to make an accurate diagnosis during operation. Despite the signs of peritonitis and its characteristic exudate, the perforation in the stomach is difficult to find. In addition, to division of the gastrohepatic omentum and direct inspection of the posterior wall, there is another simple method serviceable to find the ulcer. The index finger of the exploring hand gently palpates the anterior wall of the stomach until a distinct depression is found in the posterior wall, into which the anterior wall can be invaginated. Also, the presence of enlarged lymphatics along the lesser curvature may point toward the actual site of the perforation. When the ulcer is found, the gastrohepatic omentum is rapidly torn with the finger and the posterior wall of the stomach carefully examined. It is possible, when the ulcer is situated close to the lesser curvature, to evert the posterior wall so that the perforation may be securely sutured. If the ulcer is situated close to the greater curvature the opening should be made in the gastrocolic omentum. In either instance liberal drainage should be provided.

Perforation of an ulcer on the anterior wall of the cardiac part of the stomach is rare. The symptoms, in such a case develop and differ greatly from the usual pyloric or duodenal ulcer. One should recall that this part of the stomach, especially the area close to the lesser curvature, lying high up in the abdomen, under the left costal arch, is sheltered by the left lobe of the liver. If the point of perforation is small, the leakage is gradual, slow and trickling in nature, the liver contracts adhesions to the parietal peritoneum and anterior wall of the stomach. The round ligament of the liver becomes infiltrated and swollen. A distinct abscess cavity is thus formed. This represents, of course, the initial mechanism in the formation of a subphrenic abscess. Occasionally, the fluid gains access to the general peritoneal cavity. The symptomatology, in the beginning, is that of perforated ulcer; but, after encapsulation and subsidence of the peritonitis, the condition is likely to mislead and cause delay, though, of course, immediate operation is imperative. One should consider this type of lesion, particularly in operating for peritonitis of unknown origin. In order to expose clearly the site of perforation, the incision should be extended upward, in the median line, to a point where the major part of the stomach can be inspected. The region under the left costal border is not ordinarily easy of access, especially if a right rectus incision has been employed. The presence of considerable fluid in this region is significant. A large amount of the extravasated fluid flows upward and backward toward the subdiaphragmatic space. The surgeon notes, studding the stomach in the region of the ulcer, numerous placques of greenish white fibrin. One is able, with the examining finger to feel the craterlike depression of the ulcer. The actual hole may be covered with a tab of mucous membrane. If still in doubt, one has merely to grasp the stomach and listen to the hissing sound of the escaping air. An illustrative case is the following.

Case.—P. M., male, aged forty-one, married. Admitted to the Rockaway Beach Hospital July 22, 1919; discharged September 8, 1919. The family history was negative. The past history showed that the patient had taken six glasses of beer a day, tobacco moderately. He had had gonorrhea eighteen years ago, typhoid fever and pneumonia twenty-two years ago. The present illness began seven weeks before when the patient noticed distress and discomfort an hour after eating. Pain also was experienced in the epigastric region, sharp in character, did not radiate, relieved by vomiting and increased by taking food. There had been severe eructations. The day before admission to the hospital the patient was seized with severe abdominal pain while stooping over his automobile. The pain had been confined to the epigastrium and radiated to the left shoulder. Complete collapse followed. The patient was brought to hospital in an ambulance.

The physical examination showed an adult male, white, who appeared seriously ill. Eyes and ears normal; tongue coated; apex of the heart in the fifth intercostal space three inches from the middle line; no murmurs heard. Abdominal examination disclosed extreme tenderness in epigastrium with extreme rigidity of both recti. The muscles, joints and lymph nodes were negative.

Operation, July 23, 1919; median incision. A large amount of purulent fluid, but odorless, was found in the peritoneal cavity. The appendix was small and not especially inflamed or diseased. The incision was lengthened upward in the region of the left lobe of the liver. A large amount of fluid was present, the cavity being formed by the parietal peritoneum to the liver and the round ligament. The stomach when discovered was covered with numerous large greenish white flakes of fibrin. On the anterior wall of the cardiac end of the stomach, about midway between the lesser and greater curvature, was a perforation. Its margin was hard and in the centre could be felt a small opening through which air escaped freely. The perforation was infolded with four interrupted linen sutures. A piece of omentum derived from the lesser curvature was placed over this suture. A large amount of gauze packing was disposed in a circular manner along the ulcer. One drain passed upward over the liver to the subphrenic space. Suprapubic split rubber tube was inserted through a stab wound just above the pubes. The patient made a complete recovery. He was discharged September 8, 1919, with a solidly healed incision.

A median epigastric incision is best, if the diagnosis is clearly established. The incision may be modified by placing it an inch to the right of the median line. The anterior sheath of the right rectus muscle is divided at this point and the muscle retracted outward. If the diagnosis is undetermined, make the incision through the fibres of the upper right rectus muscle. This permits the gallbladder and the appendix to be studied. An upper right rectus incision is also serviceable when the diagnosis is exact and definite.

The division of the peritoneum is generally accompanied with the sound of escaping air. Frequently as the exudate, intermixed with air bubbles, flows over the margin of the wound, a distinctive gurgling sound is heard. The exudate appears as a milky white or slate colored fluid, mixed with the food particles present in the stomach or duodenum at the time of perforation. At an early stage, no fecal or putrifactive odor is detected. The exudate differs notably from that seen in peritonitis caused by appendicitis or perforation of the lower ileum.

When the patient is operated on at an early stage one fails to find distention of the intestines. This, perhaps, is owing to the fact that a certain interval of time is needed for the development of peritonitis. Furthermore, the air in the peritoneal cavity may act as a compressing agent. One usually notes when dividing the peritoneum the escape of air. It produces a slight whistling sound. This is indubitable evidence of intestinal perforation. At a late operation a large amount of fluid is usually found. This fluid is characteristic, being odorless, and is in marked contradistinction to the peritoneal fluid found in perforation of the ileum or appendix. It contains food particles, particularly, if the patient has eaten a short time before perforation. The fluid passes at first to the subhepatic space and then downward in the right dorsal gutter, external to the ascending colon, to reach the right iliac region. From this point the fluid passes rapidly to the pelvic cavity. One occasionally hears in the region of the perforated ulcer, a gurgling or bubbling, due to the intermittent escape of air or fluid from the stomach or duodenum. On account of large flakes of fibrin in the region of the perforation the ulcer is often difficult to see. Under these circumstances the perforation is easily found with the tip of the index finger. Caution must be observed here in order not to dilate unduly and enlarge the perforation. The ulcer is also recognized by its indurated margin.

The pylorus may be covered with delicate white, stringy adhesions. The ulcer may be seen as a stellate scar. On palpation, a definite scar induration with the feel of a marble is noted. Grasping the stomach with gauze sponges the pylorus is rapidly brought into view. The perforation which can then be seen, generally, is delivered into the wound for suturing. In a late case with diffuse peritonitis, the exudate forming a pool or puddle, completely obscures the anatomy and prevents a clear view of the perforation.

The ulcer though found anywhere in the stomach, is usually prepyloric, pyloric or situated along the lesser curvature. It may be impossible to discriminate between a pyloric and a duodenal ulcer. As a rule, the position of the pyloric veins suffice to determine the beginning of the duodenum.

At operation, it is difficult to decide definitely whether the ulcer is pyloric or duodenal. By experience gained from operating in chronic ulcer cases, it has been determined that the ratio, three duodenal to one gastric ulcer maintains. The majority of duodenal ulcers are situated in the first three quarters to one and a half inches of the duodenum. A few occasionally are found in the second part, though the records on this point are not accurate, since there is no definite line of division between the first and the second portions of the duodenum. The pyloric veins generally indicate the line of division between the pylorus and the first part of the duodenum. This point is unavailing during an operation on account of the exudate and the intestinal distention which prevent the demonstration of the veins.

When the perforation is found suture is attempted. But, at times, the gurgling of gas, the flooding of the field with gastric contents and the rapid and constant movement of the stomach, or embarrassed respiratory movements, render this step best. Pursestring or interrupted sutures may be difficult if not impossible. Linen or silk sutures are used. Two rows are preferable. When suture is technically impossible on account of too large an opening or friable tissues, a tamponade should be used by packing an abundance of plain sterile gauze against the ulcer. In order to prevent the tearing out of the sutures the needle should pick up the duodenum or the stomach at a distance from the site of actual perforation. It would appear that the tissue immediately surrounding the ulcer is, at times, inflamed and necrotic. One must not forget to employ tabs or flaps of omentum to cover the ulcer.

Always employ drainage. Insert directly to the point of perforation a split rubber tube drain or cigarette drain and surround it with a liberal disposal of plain gauze packing. This technic is followed provided the ulcer can be securely sutured. If the ulcer cannot be closed properly, employ a large amount of gauze packing, placed circumferentially around the perforated ulcer and eliminate the use of the cigarette or split rubber tube drain. If an extensive diffuse peritonitis is present insert one drain, generally a cigarette or split rubber tube, to the socalled space of Mórrison. And in instances of pronounced purulent peritonitis always utilize suprapubic drainage.

The technic for the performance of this is as follows: The index finger of the left hand is pressed firmly against the abdominal wall at a point immediately above the pubic arch. With a scalpel held in the right hand, an incision is made in the linea alba about two inches above the superior border of the pubes. The left rectus sheath is incised and the muscle fibres split with the handle of the knife. At this point the index finger of the hand within the abdomen exerts increasing pressure against the upper angle of the incision. A sharp pointed hemostat is pushed upward, inward and backward against the internal index finger. By following this technic accidental rupture of the bladder is avoided. The opening in the peritoneum, made by the hemostat, is torn or enlarged by the fingers. In all instances of purulent peritonitis the opening of the peritoneum at this site permits a generous escape of fluid. A split rubber tube drain is then passed downward into the cul de sac, the inferior extremity of the drain resting on the bottom of the pelvic peritoneal pouch. One suture, preferably of silk worm, passing through the skin margins and rectus sheath and piercing incidentally the drainage tube, prevents dislodgment of the tube and checks the slight hemorrhage. Of course, the drainage is profuse and necessitates the changing of the outer dressings at least once a day. On the fifth day the suprapubic drain is removed and the mouth of the drainage opening kept patent by inserting a small piece of gauze packing. Remove the upper drains at the site of the ulcer on the fifth day. In the case of gauze packing, this should be removed gradually, at least four inches being withdrawn each day.

The question of performing gastrojejunostomy for acute perforated ulcer has been discussed at great length by many writers. Despite the prolonged debate which has centred around this question, no dogmatic statement can as yet be made.

The chief arguments in favor of immediate gastrojejunostomy for perforated ulcer are that it permits immediate feeding and the early administration of fluid, affords drainage to the stomach and relieves the tension within the stomach.

In debating the usefulness of gastrojejunostomy in the treatment of acute perforations, the question becomes narrowed, of course, to pyloric, prepyloric and duodenal ulcers, since it is universally admitted that the operation is best adapted and most serviceable in these distinctive types of ulcer. Ulcer, situated elsewhere in the stomach, is best treated by resection, excision or cauterization. In passing it is interesting to note that among French surgeons it is not uncommon to employ in perforated ulcer, so formidable a procedure as excision.

Of course, there is no question as to the value and benefit ascribable to gastrojejunostomy in chronic pyloric or duodenal ulcer. While the operation is not a panacea, the ultimate results are excellent and often curative. Though it is worthy of note that perforation has taken place despite the previous performance of gastrojejunostomy.

Considerable dispute has centred round the question whether the ultimate results in perforated ulcer are better with or without gastrojejunostomy. In the past the question has always been approached by the method of statistical analysis. The question should be approached from a physiological and pathological viewpoint. Surgical deaths without autopsy are of slight value in basing decisions. In general, it would appear that the weight of opinion is that the ultimate results are better with the employment of gastrojejunostomy. Of course, the entire question is exceedingly difficult to decide, since pathological variations are so great in individual instances. If each ulcer were of the same size, duration and extent, to employ the method of statistical comparison would have greater scientific support.

In certain perforations, owing perhaps to the enfeebled or cachetic state of the patient and his diminished reparative powers, the protecting adhesions which ordinarily develop in the region of the ulcer and which are stimulated by the gauze packing, are imperfectly formed so that the opening in the stomach reopens and communicates with the exterior of the wound. The resulting gastric fistula is an extremely serious complication. The contents of the stomach flow constantly over the wound and the irritating secretions excoriate and inflame the skin. In addition there is a great loss in nutriment owing to the escape of a large part of the ingested food and fluid. In the case of a duodenal fistula, a remedy is at hand in the temporary ligation of the pylorus, supplemented by posterior gastrojejunostomy to establish the continuity of the intestinal tract.

The foregoing is an epitome of definite notes and records of impressions written immediately following operations when the actual details were vivid and fresh in the mind. Hence, it is an abridgment of personal views based on observations demonstrable at operation. Admitting that these facts may be nothing more or less than repetition of somewhat trite clinical beliefs they represent, nevertheless, a precise program for the practical treatment of perforated gastric and duodenal ulcer.

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The Operating Room*

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(*Concluded from page 606*)

"The approximate size and weight of bacterial dust particles have been ascertained by different observations and experiments. If, for example, in quiet air (air of a room) dust, containing bacteria, be stirred up; in the beginning there are great quantities of bacteria in the air; soon afterwards—say thirty minutes—because of the settling of the dust most of the bacteria have disappeared from the air and there remains practically nothing but spores of mould fungus. Air currents of a speed up to two tenths mm. cannot maintain in suspension or carry away the heavier bacterial dust particles; the lightest bacterial dust, from clothing and from pocket handkerchiefs (never from the floor) can be held in suspension and carried away horizontally by air currents of from 0.2 to 2 mm. speed" (35).

Until 1897 atmospheric infection was supposed to be due almost exclusively to bacteria carried by particles of dust. In 1897 Flügge (36) called attention to the possibility of microorganisms being carried in droplets and bubbles. Flügge (36) and his associates, with bacillus prodigiosus in their mouths, spoke loudly, sneezed and coughed in a room where agar plates had been exposed. They thus proved that by such acts droplets or minute particles of mucus are ejected from the respiratory tract into the air. They further showed that these minute particles are driven by the ordinary air currents of the average room to all levels and to various distances. Among other things Flügge (36) says: "Wound infection requires a special discussion—particularly the peril of infection from droplets of excretion which are sprayed into the air and which threaten the asepsis of operations. In spite of every precaution, in recent years operators have been obliged to record inexplicable cases of suppuration and sepsis. The cause of these disagreeable results does not admit of ready explanation. We have blamed insufficient disinfection of the hands and have sought to improve this without wholly satisfactory results. We also thought of the air which in the original Lister process was considered almost as important as the contacts. But, then, we only considered the dry germ laden particles of dust in the air and from these only did we fear eventual infection. With this idea in mind we sought principally to minimize the transportation of dust to the air of the operating room; we made those having business there wear sterilized gowns and overshoes; we moistened the floor, etc. Moreover, the content of dry, germ laden, dust particles in the air of operating rooms has been determined several times with contradictory results."

Flügge then says that the occurrence of wound infection from the dust particles of the air is very limited and states his reasons for so believing. "It is much more apposite," continues Flügge (36), "to consider air infection of operating wounds as arising from drops of secretion ejected from mouth and nose by those present, in the act of speaking, coughing or sneezing. In the saliva of the healthy we frequently find Staphylococcus pyogenes aureus; occasionally Diplococcus lanceolatus. When there are the most trivial pathological changes in the mucous membrane of the throat we find masses of streptococci. Carious teeth constitute a mine for all possible more or less suspicious bacteria. Here we are confronted with pathological varieties which are always dangerous; they are not debilitated by drying, but, as many animal experiments have shown, they are often of the greatest virulence. The operator, the assisting personnel or the spectators may be responsible for the dissemination of these droplets. The more people who are present the louder the talking, the greater the percentage of colds and coughs on hand—the greater the danger. It is of little use to keep the spectators some distance from the operating table. The weakest currents of air can carry most of the disseminated droplets a distance of several meters to be deposited finally upon the field of operation or upon the instruments which are usually exposed. The patient, himself, is a source of danger not to be overlooked. With the irregular and often jerky respirations characteristic of chloroform anesthesia he can disseminate droplets of his own saliva and thus infect the operative field. Wetting the operating room floor so violently as to raise spray is more dangerous eventually than dry dust. I do not doubt most wound infections originate from contact, which, more than air, has quite properly received the surgeon's greatest consideration in the past. We need not, however, ignore entirely the danger to operative wounds which exists in excretion droplets. These are scattered in the air, where, hovering lightly, they may be carried far. It is possible that many irregularities in the course of the most efficiently protected operative wounds are to be traced to this hitherto disregarded means of infection" (36).

In addition to Flügge, many others have from time to time conducted experiments in order to determine both the quality and quantity of atmospheric microorganisms, as well as their relation to wound infection. Schimmelbusch (33) found by numerous tests in von Bergmann's clinic that, "with the auditorium occupied, the number of bacteria which settled upon the surface of a wound a square decimetre in extent, in the course of a half hour, is about sixty to seventy."

Gordon (37) confirmed Flügge's experiments with Bacillus prodigiosus and also, by means of his streptococcus test, succeeded "in proving the spread of the particulate matter from the mouth through the air of the room to the same extent and distance as in previous experiments carried out with Bacillus prodigiosus." When the same author examined the air of the House of Commons, he frequently encountered an air streptococcus, "and found that it was the most frequent streptococcus in air directly contaminated by material brought in from the streets by members upon their boots." Gordon continues: "Working on similar lines to those adopted when developing the bacterial test for particles of saliva, I have shown that a certain staphylococcus, possessed of constant and definite characters whereby it can be identified, is uniformly and abundantly present in particles detached from the human skin or scalp, and that this microorganism serves as an index whereby the presence of such material can be identified. The skin staphylococcus in question grows well anaerobically, and is best detected in air by exposing broth and then incubating it anaerobically at 37° C. This microorganism, which is identical with Staphylococcus epidermidis albus of Welch, differs from Staphyloccus pyogenes albus in a number of points, notably by reason of the fact that it fails to decompose mannite with an acid reaction, whereas Staphylococcus pyogenes albus rapidly decomposes alcohol with a strong acid reaction."

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Dudgeon and Sargent (38) having exposed a large Petri dish as near as possible to each of a series of operative cases, as long as the wound remained open, found in most instances large numbers of colonies consisting chiefly of various sarcinæ and moulds. Occasionally, only, did they find a Staphylococcus albus, which would seem to dispose conclusively of the argument that the Staphylococcus albus encountered in such experiments comes from the air.

In 1904 Petri plates were exposed for different periods of the day in the amphitheatre of the Boston City Hospital and Monks (39) quotes the bacteriological findings which are practically the same as those of previous investigators: 1, at no time during the twenty-four hours was the air free from organisms; 2, more bacteria were found when the air had been stirred up; 3, the vast majority of organisms found were harmless saprophytes, though in some plates of every series Staphylococcus albus and aureus were found—streptococcus, in two instances only; 4, no great difference in the number of colonies obtained at different levels, excepting on those plates laid upon the floor.

Ten years later, in 1914, J. and R. Villette (40) conducted three kinds of bacteriological researches on the air of operating rooms: A, Petri dishes were exposed for thirty minutes, the extent of the media being equal to the wound area; B, count of colonies; C, development of the cultures, and massive inoculation. They examined the air of operating rooms in their own hospital and then such rooms in private houses as might be chosen for an operation. In kitchens or bedrooms with carpets, or sanded in poorer homes, from nine hundred to two hundred colonies were developed. In bedrooms with bare floors or bath rooms, from one hundred to twenty colonies. In operating rooms they found three to no colonies. In their own aseptic operating room they found no growth. Cocci taking the gram stain were the only microorganisms found. They discovered neither bacilli nor streptococci. The cocci encountered grew rapidly on potato, bouillon, gelatin bouillon, and milk. The Villettes heated the cultures to 105° for forty-eight hours and then injected ten c. c. into rabbits without any result. They conclude that although it is not prudent to operate in bedrooms or in kitchens, it seems that contamination from the air need not be taken into consideration as a factor in operative infection.

It has been known for several years that expired air is free from germs and that there is no danger from the ordinary breathing of the spectators. Masks are worn, as a rule, to prevent droplet infection. I believe, however, that, if a mask causes great concentration of moisture in the neighborhood of a surgeon's mouth and chin, he will be less dangerous to the operative field with his mouth uncovered and closed. If he is obliged to teach, let him talk away from the wound. Jordan (41) has summed up the question of air infection in a few words: "The fact that minute droplets of moisture or mucus may be discharged into the air by coughing, sneezing, and talking, and may then float about for some time in the neighborhood of the person discharging them, seems to be the most significant result of air examination."

What then shall we do with students, visiting physicians and other spectators? Sargent (8) says: "Theoretically, those not directly engaged should either be provided with complete outfits of overalls, caps, veils, and boot coverings, or they should be separated by a glass screen from the main body of the theatre." Practically, this difficulty is being solved, in a measure only, by demonstrating operative surgery to small classes in small operating rooms where the few spectators present can be properly clad and carefully inspected. In some hospitals, the large amphitheatres are reserved for the teaching of surgical diagnosis. Rose and Carless (42), writing of *The Operating Theatre or Room,* say: "The arrangement of this necessarily depends upon considerations of space and finance. It should not be unnecessarily large, and the old fashioned theatre with tiers of seats overlooking the central area is not desirable."

The operating room itself should be simple in construction. There should be no recesses, corners or ornaments. Floor, ceiling and walls should be fashioned so as to stand the copious use of water. According to Rose and Carless (42), "The walls should be free from ledges on which dust may accumulate, and lined with white tiles or glazed bricks or, better still, present a smooth surface painted with white enamel, which can be washed down with a hose; of course all corners should be rounded. The floors must be impermeable, and slope towards an open channel on one side of the theatre, so as to allow of suitable flushing with a hose." Among the various materials used for the floor in the past Beatson (6) mentions terazzo (small marble blocks joined by Portland cement and then polished) tiles of various kinds, glass, asphalt, cement, plaster of Paris soaked in oil and linoleum. The objections to the use of these materials are: tiles must have grooves and joints between them and are liable to stain; glass is too slippery; asphalt, too soft and absorbent;

cement is likely to crack; oiled plaster of Paris is not durable and linoleum will not stand the wear and tear (6). Wheelwright (7) states that where terrazo is used it should be interrupted at certain intervals by marble strips in order to guard against cracking. Hamilton (43) used torgament (an asbestos material) for his floor because it was free from glare. I believe that Knoxville marble is the best material for the floor of the operating room. Second to Knoxville marble I would choose tiles. As Hamilton (43) says, tiles can be fitted so closely now that practically they are a continuous surface. "After all, a sheet of glass if one runs one's finger over it can be shown to hold plenty of dust" (43). What we seek in a material for an operating room floor are smoothness, durability and resistance to the penetration of fluids. Marble is the material that offers these characteristics par excellence, and, as Wheelwright (7) tells us, Tennessee marble is preferable to white Italian or American white marble.

Having viewed with concern the growing custom of constructing operating room floors without drains, and not being impressed with the idea that because a thing is new it must therefore be true, I have sought authority for the *raison d'être* of the drainless operating room. Through the kindness of Dr. L. Grebenc I am able to quote from a letter to "International Medical and Surgical Survey" from Dr. John A. Hornsby, a specialist in hospital construction: "I never think of putting drains in operating room floors. They are nasty, smell, cannot be properly reached for cleaning, and consequently are constantly emitting gases and odors. That is precisely the thing we have been attempting to get away from in our hospital planning for years. The thing to do is to have an absolutely clear floor with the space between the tiles entirely filled so that no cracks are left for dirt, and then to clean with a mop. Sometimes this mopping has to be done during and between operations, but much better so than to have germs and gases and dirt that it is our main work to get rid of. Why take so much trouble and spend so much money to have nonabsorptive floors with turned cove bases, flush with both wall and floor, and then demand that the floors themselves shall be absolutely free from even the smallest cracks, and then at the same time leave one great germ breeder right in the middle of the floor?"

I think that the mop alone will but partially cleanse the floor, leaving behind myriads of more or less virulent germs to be dried and disseminated. Mechanical flushing with scalding water seems more bacteriologically clean to me. I do not believe that a mop on the floor is any more efficacious surgically than a mop on the hands.

Unpleasant odors are no longer considered provocative of disease. Rosenau (44) writes: "The old bugaboo of sewer gas that frightened our fathers before the days of bacteriology is no longer feared by sanitarians, although its influence still pervades the antique plumbing regulations in force in many places. It is indeed desirable to keep the air of sewers from mixing with the air we breathe—the debilitating influence of all impure air should be avoided—but the danger of anyone's becoming infected with the germs of disease by breathing sewer gas is ordinarily so extremely small as to be quite negligible."

It has been shown by several observers that the danger of bacteria being translated from sewers and sewage into the air under usual conditions is very remote. To quote again from Rosenau (44): "Nägeli in 1877 showed that putrescent liquids kept in the same sealed vessel for over two years did not infect each other. Sir Edward Frankland then showed that lithium carbonate in solution did not contaminate the air, but that when effervescence was produced the breaking of the bubbles on the surface of the liquid carried the lithium a distance of twenty-one feet up a vertical tube. The inference was that sewage through fermentation or splashing may send bacteria into the air. Pumpelly in 1881 and others since have shown that bacteria are not given off from liquid if the surface remains unbroken, even though the air may blow over it. In 1893 Miquel began a monumental work on the bacteria of the air. He made routine observations at the Montsouris Observatory, and for four years compared the bacteria in the air of a Paris street with the air of sewers. He found sewer air relatively pure from a bacteriological viewpoint. Carnelly and Haldane in 1877 found fewer bacteria in the sewers under the House of Parliament and other places than in the air of adjacent streets. The number of bacteria was largest in the best ventilated sewers because these brought the street bacteria along with them. Abbot in 1894 showed that cultures of Bacillus prodigiosus are not carried over in bubbles produced by natural fermentation (yeast in a carbohydrate medium), but may be carried a short distance by blowing air at considerable velocity through the culture. He concluded that the danger of bacteria being transmitted from sewage into the air under ordinary circumstances is practically negligible. In 1907 Horrocks revived this question by placing Bacillus prodigiosus in the water closets of a large military hospital in Gibraltar, and recovering them on plates suspended on top of the soil pipes and in man hole openings. His work gave countenance to the views of a number of English sanitarians who maintain the reality of the danger from this source. Winslow repeated Horrock's experiments in 1909, using the ordinary sewage of Boston, and by using quantitative methods threw a different light upon Horrock's conclusions. He found that a vigorous foaming produced very slight bacterial infection of the air—only five prodigiosus colonies in thirty litres of air. Further, the infection always remained localized. Generally, he found the air of house drains singularly free from bacteria. It seems, therefore, theoretically possible but highly improbable, that infection may take place in this way. Practically the question seems to have little importance. Thus, out of a series of examinations of plumbing systems in actual use, Winslow found intestinal bacteria only four times in two hundred litres of air, and these directly at the point of local splashing. If there is any danger of sewage bacteria coming into our houses, it is rather that they are dragged in by rats, roaches, water bugs, and other vermin that use sewers and drains as highways" (44).

The obnoxious gases and evil odors may be prevented by a well trapped drain which need not be in the middle of the floor but may be placed in one corner of the room, the floor slanting in that direction. I believe, however, that mechanical cleansing by flushing with water, even if the drain is untrapped, is surgically safer and cleaner than the most strenuous of moppings.

During the last few years the color of the operating room has demanded considerable attention: Because it suggests all that is immaculate, throwing into bold relief the smallest spot of visible contamination, white has been the color most used for the floors and walls of operating rooms. Sherman (45), however, in 1914 introduced a "spinach green" operating room because of the glare of light encountered by his eyes from white rooms—a glare which rendered his eyes temporarily useless when he looked back into the less illuminated wound. The color scheme, Sherman thought, should start from the red of the blood and of the tissues. He, therefore, advised that green, the complementary color to red, should be chosen for the floor and wainscot. He selected the shade of spinach green because it seemed to be complementary to hemoglobin. The chlorophyl of spinach contains iron, so it is said, in the same chemical combination as is the iron in hemoglobin. Above the level of a six foot wainscot he finished the walls in white tiling up to the ceiling which he painted a bright buff. In this manner he imitated the optical environment out in the fields, where the ground of the surroundings, to above the level of the eyes, is green, and the sky overhead full of white daylight. He next found that the light reflected by the white sheets and towelings was as embarrassing as had been that from the floor. He thereupon had green sheets and towelings provided but found that the color in these materials would not stand sterilization—they would turn dingy gray. Sherman then surrounded the entire operating field with black from which no light whatsoever could be reflected. In addition to towels and sheets of black he also used black gowns and black covers for his instrument tables. Murphy (46), whose abstract of Sherman's paper I am using freely, states that when the hospital of the Colorado Fuel and Iron Company, at Pueblo, was built in 1902, R. W. Corwin, the chief surgeon, had the walls of the operating room covered with sheet lead for the same reason and that black sheets had been in use for two years.

The White Operating Room is the title of an article in which Secor (47) takes issue with Sherman. Secor insists that the admission of sunlight into the operating room is necessary both for illumination and for sterilization. He has built an octagonal room, the ceilings being carried to a point and giving the effect of eight triangular panels. The walls and furniture are white and to protect himself from the glare he uses a modified Mayo cap and wears large amber tinted spectacles. Secor says that white will show up macroscopic dirt much better and that white makes it easier to get rid of microscopic contamination because of the effect of light on bacteria. Tinted walls are much more difficult to keep clean and sterile, says Secor. The same writer thinks that to tint the walls does violence to the esthetic and psychic effect of the pure white room. In The Green Operating Room at St. Luke's Hospital, San Francisco, his latest article on this subject, Sherman (48) tells us that he has changed his sheets, towels and gowns from black to dark blue, deeming dark blue, a pleasant color, preferable to black, the absence of color. He quotes Gardner (49) as saying "in some factories paints having a slightly greenish or other tint would be desirable, since a small amount of some colors may reduce the glare, but will not materially reduce the illumination." Sherman (48) emphasizes the fact that he is striving for maximal illumination with minimal glare. The complimentary character of green to the red of the blood has been the basis for the selection of that color for his operating room. Hering has shown that in pure red there is no green; and that in pure green there is no red. These two colors cannot be perceived at the same time in the same color. As far as sensation goes they are mutually exclusive. Further, Sherman declares that even if green had no special relation to red, it still would be the first or one of the first colors to choose, because of its place near the middle of the spectrum. Many operators are attempting to rest their eyes by requiring that the floor and lower half or more of the walls of the operating room be painted gray or some darker color. The late Francis T. Stewart (51) operated with black sheets and black towels.

To me the question seems of minor importance. If patient, surgeon, assistants and everything that might, could, would or should come in contact with the operative field, are surgically clean the color of the operating room matters little. Rubens is said to have mixed blood with his colors; let the surgeon mix colors with his blood—as long as he does not make any breaks in technic.

It is difficult for many of us who have been educated in surgery during the past fifteen or twenty years to appreciate the fact that most of the preListerian operating rooms were indescribably filthy. About twenty-three years ago Sir William MacCormac (52) delivered an address on Operating Rooms Past and Present, in which he said that he could remember almost complete neglect, in many places, of sanitary conditions in the theatre itself. He had noted an absence of any sufficient regard to surgical cleanliness or often ordinary cleanliness both in the case of the surgeon who operated and of the person of the patient operated upon. "Anyplace," says he, "was considered good enough for an operating room. There were generally sinks which communicated with defective drains, floors and benches innocent of the scrubbing brush or soap and water; marine sponges used and after being imperfectly cleansed were used over and over again. I have known theatres," continues this distinguished surgeon, "that were placed in immediate proximity to the dead house, to which they too often proved the portal." It is only by contrasting those conditions described by Sir William MacCormac with these now prevailing that we can recognize our debt both to a Frenchman and to an Englishman; and that we can realize that operating rooms of today are monuments to the memory and honor of Pasteur and Lister, who founded modern surgery.

The references will appear in the author's reprints.

Editorial Articles

STANDARDS FOR MALNUTRITION.

No health movement of modern times has been of so much significance as that for better nutrition, and though its application is late, when the human being has reached school age, it is, in this instance, much better late than never. The standards set up, however, for the judging of malnutrition have been a little too hard and fast. They have been put forward on the assumption that we are all built along the same lines of architecture, but anyone at all experienced in anthropometry knows that we are not so constructed and that, while there is a fairly fixed mean set of weight-height measurements for children of all lands, they cannot all be brought to conform to this one plan. We are not dealing with children of one type, not even within a single race, and in particular when we are studying the American child. No one is better qualified to "say something" on this matter of standards of nutrition than Charles K. Taylor, and he has said it in an article entitled The Great Underweight Delusion published in a recent number of the *Outlook*. Mr. Taylor made, some years ago, an anthropometric study of children of school age and published a little book giving the results of his work. He found that there was no single type of build at any age that could be considered the norm, but that perfectly healthy children could be classed in three groups—the median or average type, the heavy type, and the slender type.

"It is just as normal and healthy for some children to be more slender than the average and for others to be stocky or thickset, as for others to approximate that average, that it is a matter of inherited type of build, and all we need to do is to see that a child is properly developed for his or her normal type of build. There it is in a nutshell!

"Now very certainly it is quite possible for children to be actually underweight—below the weight they really should have. But you will not learn this by putting them on a pair of scales. The point is not, 'What does the child weigh?' but 'Is the child healthy?' If the child is unhealthy, if the child is suffering from malnutrition, then, for all you know, a child may be very much under the proper weight. The test is not a pair of scales, but a proper medical examination. So that brings us to the second part of our stand. Here it is: When a child is healthy, when a child is in good condition, and particularly when that child's muscles are not flabby, but firm and efficient, then we may be sure that the child's weight is correct, *no matter what it is*. And our work, then, is merely to see that a child has a physical development corresponding to his or her type of build. . . .

"There, we hope our viewpoint has been made clear. It is based on an intensive study of some thousands of children over quite a number of years. And we repeat it finally for the sake of emphasis: If a child is healthy, and is not one of those typically fat children, then that child's weight is correct *no matter what it is*. So our concern should not be over a child's weight, but over a child's health and physical development. And this means a careful study of our school children in these two respects, and it also means, mind you, a proper feeding of school children wherever real malnutrition or underfeeding actually exists. But the standard to go by is not one of weight but of health, and of physical development."

NEUROPSYCHIATRY.

A plea was made by Dr. Adolf Meyer, at the last meeting of the American Neurological Association, for a more comprehensive psychiatrical study of neurological patients by socalled neurologists. He said it was necessary to know more about the psyche of the patient, his wishes, conflicts, problems and possible adjustments This seems fair enough and if we were to take a more comprehensive view of the situation we would realize that unless we did consider these factors we should know comparatively little about the patient. Too much emphasis is placed upon the physical side of medicine in present day practice. Practically our entire medical curriculum is devoted to the study of the chemical and mechanical functions of man. Mind, the most important, the most highly developed part of our organism, is almost entirely disregarded. The study of the emotions receives scarcely passing mention. Yet we know that emotional factors can produce any of the diseases we so fondly study in test tubes. Perhaps the test tube method is more comfortable or gives a greater sense of safety; besides, it is difficult to place emotions and wishes in test tubes. The difficulty is that we have been so busy studying effects that we have disregarded affects which are the most frequent causal factors of bodily derangement.

Meyer has sounded a good note; more of the same type will be heard and soon. We must first find out what our patient's problems are; what difficulties confront him. Then, we must ascertain how he is trying to solve these problems. We must always consider illness as purposeful if not from one angle then from another—something is trying to do something. If we search carefully enough, the cause will become apparent. True, the goals may be false. The organism may be endangered in order that an adjustment, even a false one, may be made for one segment of the organism.

One day, not too far distant, we medical men shall see man as an entity, as an organism striving for certain things and making maladjustments in the false calculations of values. Frequently, all too frequently, infantile levels are clung to for minor comforts; these must be given up or integrated into constructive adult activity if the organism is to survive. The physician of the future will know more of these values and will be better able to guide his patients along pathways of achievement. He will be able, by virtue of his knowledge of human behavior and psychical maladjustments, to prevent most of the derangements, mental and physical, which are so commonly encountered in medical practice.

Meyer must have seen the coming of this and has given warning in his address. Many will hear him; a few will profit from his foresight.

HISTORY OF DENTAL CARIES.

While dental caries is not a recent disease nor a disease confined to socalled civilization (whatever that is, or whenever it began), it has been substantially proven that it is vastly more common in more recent times and among those who eat soft foods and concentrated diets. The recently published *Studies in the Paleopathology of Egypt,* by Sir Marc Armand-Ruffer, would seem to upset this view, in that he makes the statement that caries was of common occurrence in predynastic Egypt. We are all inclined to believe that if we see a thing in print, more particularly in book print, it is true. American reviewers of this book have, very naturally, taken this attitude toward the statement of Ruffer, and, as it is of more practical moment than all the rest of the volume, they have called especial attention to it.

A reviewer in the *Lancet* also pays particular attention to this point. He says, "Sir Marc Ruffer was one of those gentle diplomatists who are ready to take other people at their own valuation. . . . One instance of this is of sufficient practical importance at the present time to call for special reference. This is the *Study of Abnormalities and Pathology of Ancient Egyptian Teeth* . . . reproduced as a chapter of the book. The claim made on page 247 as to the common occurrence of dental caries in predynastic Egyptians is utterly misleading. This affection was extremely rare in Egypt until the latter part of the Second Dynasty, and it was not really common (and this only in the upper classes) until the time of the Pyramid Age (Fourth Dynasty)."

Whether dental caries is the result of deficiency in the physical or chemical character of the food or of both combined it is certainly a defective food disease. Apparently the lack of certain chemicals (or a preponderance of others) is the chief, if not the whole, fault. There seems no other way of explaining the rapid rotting of the first set of teeth so common among certain classes of children. At any rate, it is impossible to make good instruments out of poor materials or to preserve for their maximum age teeth that are badly built. But the chemistry and construction of teeth does not begin after birth. It begins in the early weeks of prenatal existence and the food of the parent must be of great importance in the making of teeth in the child.

To sum up the possible conditions leading to caries, they are: a, lack of chemical constituents for the making of teeth, prenatal, postnatal, or both (a preponderance of certain foods, such as sugar, may possibly have the same effect by interfering with the normal use of tooth material in the diet); b, lack of use of the teeth from insufficiently coarse food; c, abnormal chemical condition of the mouth from diet faulty as to quality or quantity. Of these three possible factors the first looms largest and the second least, the third being problematic and connected with the first. As to the rôle of artificial cleansing in the preservation of teeth there is little to prove and much to disprove that it has any effect in preventing caries. Since caries is our most common (and most expensive) disease the subject is deserving of more study than any other. We are glad to note that investigation of the matter on a worthy scale has been begun by English sanitarians.

THE NITRITOID CRISIS.

The nitritoid crisis is at present regarded as a peculiar form of Widal's hemoclastic shock and is comprised among the phenomena of shock in which there is true anaphylaxis, colloidoclasia and shock due to heterogeneous substances—colloids, albumins, peptone, barium oxide—and like the latter it is above all characterized by a drop in the blood pressure.

In his researches on the phenomena of shock resulting from the arsenical products in dogs, Pomaret was able to determine the experimental factors which govern the hypotension shock due to these compounds. In order to obtain them, the phenolic function of the arsenous and novarsenous compounds must be that of precipitating for albumins, which is effected by an intravenous injection of nonalkalinized salvarsan, hence acid, and that of neosalvarsan acidified by a weak acid without any chemical action on the drug, such as a one per cent. or two per cent. solution of citric acid.

In vitro, these acid solutions, as well as the naturally acid sulpharsenobenzol, precipitate the albumins in an absorbable compound, soluble in alkalines. *In vivo,* these same solutions, according to the concentration, the acidity and rapidity of the injection, produce an entire gamut of physical states of the adsorption complex, from flocculation to coagulation, represented by colloidal complexes either secondarily soluble, on account of the bicarbonate of the blood; dispersively, a dilute injection slowly given, or indispersively, by a rapid injection, whose presence only in the circulation in this case will be accompanied by phenomena of sudden shock, similar to that produced by insoluble bodies. Hence the rupture of humoral equilibrium is represented by a complex intravascular flocculation of the colloidal micellæ of the serum, as occurs in true anaphylactic shock.

Since the physical mechanism of shock from the arsenic compounds is of the same nature, it may be regarded as phenolic shock, because experimentally it can be produced by intravenous injections of trinitrophenol or with ordinary phenol. Therefore it is not the result of chemotactic phenomena, but a purely heterocolloidoclastic process of phenolic origin with hematic disorders.

In the nitritoid crisis the condition is the same as in experimental shock in animals, the phenomenon shock being considered as independent of any previous sensitization, the hypotension ensuing upon an injection of some arsenical compound of good manufacture and not containing the indeterminate vasodilator toxin.

Whether the solution injected is acid, alkaline or neutral, the factor "blood acidity" intervenes, which is enough to cause flocculation. Usually, in subjects possessing a normal alkaline reserve, the flocculate is either secondarily soluble by the sodium bicarbonate of the plasma or is diffusible without incident, but this is not the case in persons habitually intolerant of arsenical compounds whose plasma cannot dissolve the flocculates as fast as they are formed.

This conception of the process has been confirmed by Pomaret (*Bulletin de l'Academie de Médecine,* July 27, 1921) in his experimental work on dogs, in particular when the animal was acidosic, and with a temporary hypotension induced by an injection of a neutral solution of novarsenobenzol, while no drop in the blood pressure is observed if the alkaline reserve is normal. Recent researches have shown that certain intolerant subjects in whom postarsenical erythrodermias develop are in reality acidosic, a fact which confirms Pomaret's previous opinion derived from his experimental work.

As to arsenoxide, Pomaret has found it to be a very energetic hypertensor, giving chart curves similar to adrenalin, so that it can play no part in the production of nitritoid crisis.

PROFESSIONAL DONORS OF HUMAN BLOOD.

A new public health problem, meriting serious attention from authorities, is that caused by the condition of extreme secondary anemia to be found in a number of professional donors of transfused blood. This is the opinion of Dr. L. W. Famulener, of the pathological laboratory of St. Luke's Hospital, expressed in an article in the *American Journal of Public Health* for May. Since blood transfusion methods have been established on a firm basis through laboratory tests and improved operative technic, and have been so frequently resorted to, not only in hospitals but also in private practice, the demand for blood donors has been greatly increased, until a certain group of men, attracted no doubt by the apparently easy life and money offered, have adopted blood giving as a profession. Although some of these men show as yet no apparent ill effects, and others only a slight anemia, a third group present extreme secondary anemia demanding medical attention. Among those who have come under observation at St. Luke's Hospital some presented a more marked anemia than the patients to whom a transfusion had been considered advisable.

"Responsibility for these conditions," says Dr. Famulener, "may be more or less charged to the donor, the clinician, and to the laboratory worker. The donor may exploit his blood regenerating powers for financial gain, and he may also lead an irregular life. The clinician may draw too much blood from the donor at one time, or at too short intervals; he may also be remiss in not having a full knowledge of the blood condition of the donor. The laboratory worker, who groups the blood of the patient and donor, does the cross tests between the two as well as the Wassermann reaction, may neglect to do a red blood cell count and a hemoglobin determination."

To remedy so serious a condition the writer offers several suggestions: Professional donors might be registered by public health boards, examined and officially certified as fit; the physician or surgeon performing the transfusion should be required to subject the donor to a careful preliminary physical examination and full laboratory blood tests, including red blood cell count, hemoglobin determination, grouping and cross tests of blood, and the Wassermann test. He should be required also to report officially the transfusions he makes, giving essential data relative to patient and donor—namely, Wassermann reaction, red blood cell count, percentage of hemoglobin before taking the blood, and the amount of blood withdrawn. By some such system, the author believes, not only can anemic donors be protected and prevented from losing their therapeutic and economic value, as often happens, but also normal, healthy individuals can be safeguarded from acquiring anemic conditions.

SPECIFIC DRUGS.

The ideal of the therapia magna sterilisans, a specific therapeutic agent for every variety of infection, has been placed in the foreground of contemporary interest through the labors of Ehrlich. However, it is clear that the underlying principle is not a creation of the last century, but rather an heirloom handed down to us from remote antiquity. Thus the medical code, collected by Confucius, still the orthodox guide of medical practice in China, gives exact directions concerning the remedies applicable to the various affections, then recognized. The ancient Egyptian pharmacopœia, similar in nature and purpose, has been transmitted to us in numerous inscriptions in such detail that it is almost simpler to become acquainted with the ancient practice than with that of our own times. At least, there is not much doubt left in the clinical teaching of the hieroglyphics as to what was considered the correct and only specific drug or mixture of drugs for any given known clinical phenomenon. It is clear, then, that the demand for specific therapy is age old and universal, and engraved into the thoughts and dreams of mankind even firmer than in brass or stone.

It appears well to reflect on the bearing of recent scientific advances on this problem. We have witnessed in the immediate past a progressive contraction in the number of pathological entities, termed diseases. Again and again ancient clinical units have been shown to be but groups of symptoms induced by a deeper lying process. At the same time, it has been recognized more widely that the same fundamental factor may result in clinical manifestations most dissimilar and varied in nature. Medical science shares this tendency to simplification and unification with other sciences. The chief instance is, no doubt, furnished by the resolution of the chemical atom into the proton and its electrons.

The period may be recalled in the memory of our senior brethren, when the budding clinician stepped into the waiting room of the dispensary loaded with bottles of medicine. Those clients suffering from constipation were then invited to raise their hands to receive the specific bottle of medicine, while subsequently the reverse condition was dealt with in a similar manner. No doubt, the constipation complained of, was diagnosed as belonging to the idiopathic variety.

In accordance with the evolution of medical thought, the actual list of specific remedies has been reduced to very modest proportions. A comparison of the drugs in actual use today with the pharmacopœias of antiquity, or even with the concoctions employed two centuries ago, is illuminating and suggests that we are moving in the right direction. Even the few remaining specifics are under constant critical supervision. It has been suggested that quinine exerts its effect only indirectly on the malarial parasite by changing the physical status of the red blood corpuscles. McDonaugh, the English syphilologist, lays claim to having established the fact that the beneficial action of mercury, arsenic and iodide depends entirely on their effect on cell metabolism. In this connection a recent observation of Dale may be related.

Ipecacuanha is one of the few drugs which have maintained the claim to possess specific properties. The attempt has been made to isolate the most potent among its alkaloids which, at the same time, would have the least affinity for the tissues of the host. Finally, a substance was obtained which appeared to fulfil all expectations. However, when the body was substituted for the test tube, the effect of the drug on the clinical picture and manifestations was apparently unnoticeable. It is, of course, altogether unknown whether this failure is due to the very fact that the substance is inert toward the tissues, or whether the properties of the drug or of the parasites are modified, while within the host.

Such considerations are of more than passing historical significance. They convey the lesson that our knowledge of the properties of even the most common drugs is far from being complete. This applies all the more to our insight into the mechanism of their action on the cells of the body.

The chief value, however, lies in the stimulation of inquiry into the entity of clinical symptoms. This process advances our knowledge of the fundamental factors of pathological and, incidentally, of biological phenomena and places into our hands nonspecific remedies such as physiotherapy and hygiene, based on scientific facts.

INDUCED INEQUALITY OF THE PUPILS AND THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS.

The notion of irregularity of the pupils in pleuropulmonary affections is classical. Sergent (*Bulletin de l'Academie de Médecine,* Paris, 1921) has especially studied this symptom in tuberculosis and apical pleuritis in particular. He attempts to show the importance of unilateral mydriasis due to irritation of the sympathetic, in the diagnosis of recent apical lesions undergoing evolution. This unilateral mydriasis is much more frequent than is usually suspected. Added to other symptoms, such as pain on pressure over the apex, supraclavicular adenitis and pleural roughness, it constitutes a syndrome whose symptomological value is great. Frequently it is the first element of the syndrome to appear. As it would be interesting to ascertain if this symptom could be induced experimentally by instilling a collyrium in equal quantity in each eye, that would reveal a latent inequality of the pupils and at the same time offer a valuable element in making an early diagnosis which is often such a delicate matter in pulmonary tuberculosis, Sergent carried out this test with the following technic:

First of all one must previously ascertain that the subject has no visual disturbance, no apparent lesion of the globe, nor any change in the pupil reflexes. Two drops of a one in one thousand solution of atropine is instilled into each eye, as the reaction is too slow in taking place when only one drop is used. The reaction should be carefully watched from the start as it may be overlooked if not detected at its onset. It usually begins in ten or twelve minutes and progressively increases, becoming complete in twenty to twenty-five minutes. When there is sensitization of one pupil it begins dilating and attains its maximum dilatation some little time before its fellow. At the same time—and this is more important—it will be noted that the sensitized pupil loses its reflex to light before the other, as well as its accommodation to distance.

When the maximum effect of the atropine has been reached the pupils are equally dilated, both having lost all power of accommodation, and they remain in this state for one to three days, after which the pupil on the healthy side contracts and recuperates its power of accommodation, while the sensitized pupil remains larger and goes through another phase of inequality which is prolonged much longer than the short period of inequality at the onset. To derive all the value of this test great care must be given to an exact dosage of the solution instilled into each eye. The test presents no danger when not essayed in elderly subjects or those with glaucoma.

As to results, in ten subjects completely free from any pleuropulmonary lesion, the test was entirely negative. In eighteen subjects, with a confirmed unilateral lesion, the induced homologous mydriasis developed with great distinctness in eleven and in these eleven there were signs of general evolution of tuberculosis. In three subjects the pupils remained equal during the entire duration of the action of the atropine and in these three cases the lesions were cicatricial without any evidence of evolution. In four subjects the test produced irregularity of the pupils and these subjects presented spontaneous myosis probably of paralytic nature.

In twenty-two subjects presenting lesions hardly perceptible by physical signs, in fifteen there was no spontaneous inequality but in all the induced mydriasis occurred on the side where auscultation had caused suspicion of tuberculosis. In seven subjects the pupils were unequal before the test and in six of them this confirmed the localization of the pulmonary process. In the seventh subject the inequality was inverted but both apices were found to be involved.

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Obituary.

JOHN A. WYETH, M. D.,

of New York.

On May 28th one of the city's most distinguished surgeons and writers on medical subjects, Dr. John A. Wyeth, died suddenly of heart disease at his home, 242 Lexington Avenue, at the age of seventy-seven years. His death followed quickly upon an early morning attack of acute indigestion. Dr. Wyeth is well known, not only through his professional and literary activities, but also as the founder of the Polyclinic Hospital. Previous to building this hospital, Dr. Wyeth had organized in 1881 the Polyclinic Medical School, whose headquarters were in the old hospital building at 216 East Thirty-sixth Street. This was the first postgraduate medical school in New York city, and as such attracted many graduate physicians from all parts of the country. When the new building in West Fiftieth Street was opened, Dr. Wyeth was made president of the hospital and gave up his extensive private practice to devote himself to the work of the institution.

Dr. Wyeth was born at Missionary Station, Ala., in 1845, and fought on the side of the South in the Civil War as a member of Russell's Fourth Alabama Cavalry troop. He began practice in New York in 1873 and soon built up a wide clientèle. His first wife, whose death occurred in 1915, was Florence Nightingale Sims, daughter of the well known physician, Dr. J. Marion Sims. Their three children are Marion Sims Wyeth, architect of New York city; John A. Wyeth, Jr., instructor at Princeton University; and Mrs. Alan McLean, of Morristown, N. J.

In 1918 Dr. Wyeth married Miss Marguerite Chalifoux, a lecturer on dietetics at the Polyclinic Hospital.

In addition to conducting his professional activities extending over nearly forty years, Dr. Wyeth was the author of several valuable works on surgery, among them the *Textbook on Surgery*, which went through a number of editions, and the *Handbook of Medical and Surgical Reference*. He wrote also many monographs on surgical subjects, Civil War sketches, numerous historical and biographical sketches, and articles for well known magazines, especially *Harper's* and the *Century*. His *Life of General Nathan Bedford Forrest* was published in 1899 by Harper Brothers.

Among distinguished offices held by Dr. Wyeth were the presidencies of the American Medical Association, of the New York Academy of Medicine, and of the Southern Society. He was for many years a prominent member of the Union League Club.

HENRY LOWNDES LYNAH, M. D.,

of New York.

Henry Lowndes Lynah was born in Charleston S. C., on December 1, 1878, and died at his father's home in that city on March 31, 1922. He was graduated from the South Carolina Medical College on April 3, 1900, and immediately afterward entered the Johns Hopkins Hospital in Baltimore as extern, later becoming intern in that institution. His next move was to New York, where he was for a considerable time intern at the St. Mark's, Kingston Avenue, and Willard Parker Hospitals. In private work he was widely known in New York for many years.

HENRY LOWNDES LYNAH, M. D.

He became a member of the American Academy of Ophthalmology and Oto-Laryngology, the American Laryngological, Rhinological and Otological Society, the American Laryngological Association, the Medical Society of the State of New York, being this year Chairman of its Laryngological Section. He was one of the founders and third president of the American Bronchoscopic Society.

Professionally he was actively engaged in the practice of his specialty at the Willard Parker and Riverside Hospitals, the Kingston Avenue Hospital and the Queensborough and Otisville Hospitals. He was consulting bronchoscopist and esophagoscopist to the French and Lenox Hill Hospitals, the New York Eye and Ear Infirmary, the Skin and Cancer Hospital, and the Methodist Episcopal Hospital of Brooklyn. His teaching positions were instructor in laryngology and intubation at the University of Bellevue Hospital Medical College, and he was made professor of bronchoscopy and esophagoscopy in the New York Polyclinic.

In the practice of the newer specialty of bronchoscopy and esophagoscopy he was second to only one man in this country, perhaps in the world. In devising new instruments and methods of simplifying their application, he stood preeminent.

We all must contemplate, with a deep sense of loss, the removal in his prime of this outstanding personality. The loss to the profession and the public is almost irretrievable, and to those of his close personal friends, with whom he was in intimate contact, it is irremediable. Realizing lately, that his career must be short, he pursued his work with cheerful confidence, not sparing himself, with a courage that must be a lesson to all who knew him well.

So be my passing!
My task accomplished and the long day done,
My wages taken, and in my heart
Some late lark singing,
Let me be gathered to the quiet west,
The sundown, splendid and serene,
Death.

SIR ALFRED PEARCE GOULD,

of London.

Sir Alfred Pearce Gould, the distinguished surgeon, died suddenly in London on April 19th. Alfred Pearce Gould was born in Norwich in 1852, the second son of the Rev. George Gould, a nonconformist minister. He was educated at University College, and at University College Hospital. In 1873 he was admitted a member of the Royal College of Surgeons, being elected E. R. C. S. in 1877, serving on the Council from 1900 to 1916 and acting as vice-president from 1908 to 1910. He had an equally distinguished career at the University of London, where he obtained his degree of Master of Surgery in 1876, served as a member of the senate in 1900, was dean of the faculty of medicine from 1912 to 1916, and acted as vice-chancellor during the years 1916-17. He began his professional life in 1877 as assistant surgeon and lecturer on anatomy at the Westminster Hospital, posts which he resigned in 1882, on his election as assistant surgeon to the Middlesex Hospital. He remained attached to that hospital for the rest of his life. He was president of the Royal Society of Medicine in 1902, and he was president of the Röntgen Society. In 1911 he was made a K. C. V. O., and in 1919 he was made a C. B. E.

During the war he was active in his post as Officer-in-Charge of the Surgical Division of the Third London General Hospital at Wandsworth. He published *The Elements of Surgical Diagnosis*, of which the fifth edition appeared in 1919, and was joint editor with Dr. Collins Warren of the *International Textbook of Surgery*.

Sir Alfred Pearce Gould was a man of strong character, with decided opinions, which he never took the trouble to conceal. He was somewhat self-willed and was disposed to consider only his own side of a question and therefore did not make an ideal chairman. However, if his temper was hasty, he was always ready to apologize and amenable to representations made privately. Throughout his life he was a total abstainer, and a fervent advocate of temperance. He was possessed of strong religious convictions and fervor and in these respects resembled Sir German Sims Woodhead, whose death was recorded a few weeks ago.

Sir Alfred Pearce Gould was a general surgeon with a leaning to the treatment of cancer. Indeed, he spent a goodly part of his professional life in a struggle with that greatest of the foes of man. The Cancer Research Department of the Middlesex Hospital, the creation and development of which was largely due to Sir R. Bland Sutton and him, is his most fitting memorial. He was an ardent champion of radium treatment, or rather he did his best to secure a full and fair trial of this form of treatment, and he wrote encouragingly on the subject when most other persons were still incredulous as to the value of the treatment.

JOHN HERBERT CLAIBORNE, M. D.,

of New York.

John Herbert Claiborne, the well known eye specialist, died suddenly of heart disease on May 27th at his home, 17 West Eleventh Street, New York. Dr. Claiborne was born in Louisburg, N. C., June 29, 1861. He was graduated from the University of Virginia in 1883, after which he spent some time studying in European capitals. Upon his return to this country he took up his residence in New York city and established a practice, the active and successful character of which is well known and acknowledged by his friends and colleagues. Dr. Claiborne was a member of one of Virginia's oldest and best known families. He was a descendant of Colonel William G. Claiborne, earliest Royal Secretary and Treasurer of the Colony of Virginia, and his mother was a great granddaughter of John Alston, Justice of the Supreme Court of the Colony of North Carolina in 1734. Dr. Claiborne himself contributed distinguished work to the cause of humanity in addition to his work in professional practice.

In the war with Spain he served in the line, rising from the rank of lieutenant to captain in the Twelfth New York Volunteers. In the recent war he devoted himself to many patriotic movements as well as giving valuable service to draft boards and recruiting agencies in his profession of eye specialist. During his lifetime he held many notable offices, among them that of the post of Governor of the Virginians.

He was a member of many well known societies, among them the Southerners Society, the Society of the Cincinnati, the Society of Foreign Wars, and the University, Calumet and Union Clubs. Dr. Claiborne is survived by his widow and a son, John Herbert, Jr., now a student at Lafayette College.

News Items.

Annual Meeting of Medical Society of New Jersey.—The one hundred and fifty-sixth annual meeting of the Medical Society of New Jersey will be held at the Monmouth Hotel, Spring Lake, N J., June 21st, 22d and 23d, under the presidency of Dr. Henry B. Costill, of Trenton. An interesting program has been arranged and the meeting gives promise of being unusually interesting.

Dr. Gwathmey Honored.—Dr. James Tayloe Gwathmey, of New York, was presented with a silver loving cup at a dinner given in his honor by the American Association of Anesthetists in the Hotel Jefferson, St. Louis. The inscription on the cup reads: "Founder and first president of American Association of Anesthetists for advances in the research, practice and literature of anesthesia, 1912-1922."

Pathology and Diagnosis of Tumors.—A course in the pathology and diagnosis of tumors will be given by Professor William H. Woglom, M. D., at the Institute of Cancer Research, 1145 Amsterdam Avenue, in connection with the summer session of Columbia University, New York, beginning on July 10, 1922, and lasting for six weeks. Application should be made to the Director of the Summer Session, Columbia University, New York.

Civil Service Examination for Toxicologist.—The United States Civil Service Commission announces examinations for toxicologists in the Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., as follows: Toxicologist, $3,600 to $5,000 a year; associate toxicologist, $2,500 to $3,600 a year; assistant toxicologist, $1,800 to $2,500 a year. Receipt of applications for these examinations will close on July 3, 1922.

Medical Women's International Association.—The second meeting of the Medical Women's International Association will be held at Geneva, Switzerland, September 4 to 17, 1922. All members are urged to be present. Each society of medical women in the world is invited to send one eligible delegate and an additional delegate for every hundred members. Interesting reports will be read by medical women from different countries and the constitution of the organization will probably be revised in accordance with the provisions under which it was adopted. Clinics in the different European countries may be visited en route.

New Officers of the A. M. A.—Dr. Ray Lyman Wilbur, of Stanford University, California, was elected president-elect of the American Medical Association, at the recent annual meeting held in St. Louis, Mo., under the presidency of Dr. G. E. de Schweinitz, of Philadelphia. Other officers were elected as follows: Dr. Willard Bartlett, of St. Louis, Mo., vice-president; Dr. Alexander R. Craig, of Chicago, reelected secretary; Dr. Austin A. Hayden, of Chicago, treasurer; Dr. Frederick C. Warnshuis, of Grand Rapids, Mich., speaker of the House of Delegates; Dr. L. Rock Sleyster, of Wauwatosa, Wis., vice-speaker of the House of Delegates; trustees for three years, Dr. A. R. Mitchell, of Lincoln, Neb., Dr. D. Chester Brown, of Danbury, Conn., and Dr. Oscar Dowling, of New Orleans.

Mr. Baker's Gifts to New York Hospital.—At a meeting of the board of governors of the Society of the New York Hospital, held on Tuesday, June 6th, Edward W. Sheldon, president, announced the gift of $500,000 in United States Victory Loan three and three quarter per cent. notes from George F. Baker, a governor of the society. The board, in accepting the gift, unanimously voted to establish the George F. Baker Endowment Fund of $750,000, consisting of the present donation of $500,000 and the $250,000 given to the society by Mr. Baker in 1912.

Hospital for Shell Shocked Soldiers in Bavaria.—August Hecksher, of New York, has donated ten million marks for the erection in Munich of a hospital for shell shocked soldiers. Mr. Heckscher, who is a native of Hamburg, has given millions of dollars to philanthropic enterprises here in the last few years. His largest gift was of land, property and cash endowment for the Heckscher Foundation for Children, amounting to about $4,000,000. A new building for the foundation is nearing completion at Fifth Avenue and 105th Street, and will provide a home for the Society for the Prevention of Cruelty to Children and play facilities for thousands of children. The structure will be opened this summer.

Smithsonian Institution to House Public Health Exhibit.—The National Committee on Exhibits Showing Advances in Sanitary Science has recently been formed in Washington, D. C., for the purpose of collecting and preparing material for a great popular public health exhibit in the Capitol. The members of the committee include: Surgeon General H. S. Cumming, United States Public Health Service, chairman; Dr. D. B. Armstrong, National Health Council; Miss Mabel T. Boardman, American Red Cross; Surgeon General M. W. Ireland, United States Army Medical Corps; Dr. Victor C. Vaughan, National Research Council; Dr. C. D. Walcott, Smithsonian Institution; James A. Tobey, National Health Council, secretary. Space for the proposed exhibit has been placed at the disposal of the committee by the Smithsonian Institution, which is visited by more than half a million persons annually Plans are under way to install exhibit material secured from official and voluntary health agencies. The secretary's office is in the national headquarters of the Red Cross at Washington.

Public Health Service Entrance Examinations.—The examination of candidates for entrance into the regular corps of the United States Public Health Service will be held July 10, 1922, at Washington, D. C., New York, Chicago, San Francisco and New Orleans. Candidates must be not less than twenty-three nor more than thirty-two years of age, and they must have been graduated in medicine from some reputable medical college, and have had one year's hospital experience or two years' professional practice. They must pass satisfactorily, oral, written and clinical tests before a board of medical officers and undergo a physical examination. Successful candidates will be recommended for appointment by the President with the advice and consent of the Senate. Requests for information concerning this examination should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C.

Personal.—Dr. Joseph Blake has again been honored by the French Government, by being made an officer in the French Legion of Honor. During the war he was made a Chevalier at the opening of the Red Cross Hospital in Paris.

Dr. Hilding Berglund, of Boston, has been awarded the John White Browne scholarship for research at the Harvard Medical School.

Dr. Ethel M. Watters, of San Francisco, has been appointed consultant in the administration of the Sheppard-Towner Maternity Act. Dr. Watters, who received her medical degree from Johns Hopkins University, has been director of the Bureau of Child Hygiene in the California State Board of Health.

Dr. Henry Dwight Chapin has been invited by the English-Speaking Union of England to make an address in London. He is sailing on June 22d and will speak on The Rôle of the Child in Cementing International Relations. He will also make an address on reducing infant mortality in London Baby Week—the first week in July.

Dr. Albert H. Freiberg, professor of orthopedic surgery at the University of Cincinnati, College of Medicine, has been elected president of the Cincinnati Academy of Medicine.

Dr. Robert A. Strong, clinical professor of pediatrics, Tulane University, was elected president of the Air Service Medical Association, at the annual meeting held in St. Louis, May 23d, under the presidency of Brigadier General H. Wilmer, of Washington, D. C.

Harvard School of Public Health to Be Opened in September.—The first definite announcement has been made of the scope of the new school of public health which will be opened at Harvard University in September. It states that systematic instruction will be given leading to the degrees of bachelor of public health, master of public health and doctor of public health, while students in the school will be eligible under certain conditions to be candidates for the degree of doctor of philosophy in hygiene or of doctor of medical sciences.

The new school is the outgrowth and continuation of the school jointly conducted by Harvard and the Massachusetts Institute of Technology since 1913, and will also include certain departments, such as those of industrial hygiene and tropical medicine, which have hitherto been a part of the Harvard Medical School. It will be closely associated with the medical school, and for the present its headquarters will be at the medical school buildings on Longwood Avenue, Boston. It will have its own faculty, however, and to a certain extent its own buildings and laboratories, although Dr. David L. Edsall will serve as dean of both the medical school and the school of public health.

The faculty of the school, in addition to Dr. Edsall, will include Dr. Milton J. Rosenau, Dr. Richard P. Strong, Dr. Walter B. Cannon, Dr. Ernest E. Tyzzer, Dr. C. Macfie Campbell and Dr. Cecil K. Drinker, all of the staff of the Medical School; Dr. Roger T. Lee, professor of hygiene at Harvard; Prof. Lawrence J. Henderson, Prof. George C. Whipple, of the Harvard Engineering School, and Prof. Edwin B. Wilson.

LONDON LETTER.

(*From Our Own Correspondent*)

LONDON, *May 2, 1922.*

A New Bacillus—The Royal College of Physicians—The Situation as Regards Consultants and the Need for Reforms in Medical Practice—Mental Hygiene Congress in Paris—London School of Hygiene—Amalgamation of Norwich Hospitals—The Earliest Account of Pellagra in Egypt.

Dr. Arnold Renshaw and Mr. Fairbrother recently gave an interesting account of the results of their investigations in regard to the employment of dyestuffs in the treatment of disease. They showed that in certain diseases the use of suitable dyestuffs was followed by beneficial effects and gave reason to hope that their investigations would prove that several other diseases could be treated successfully by similar means.

In the *British Medical Journal* for April 29th, these investigators announced the discovery of a new microbe found in diabetic patients. In regarding diabetes from the point of view of its mechanism the authors point out that little is known concerning the source of the socalled acetone bodies, which in this disease are eliminated from the body. It is the general opinion of those who have studied the matter that these substances are derived from the protein molecule, from the fats of the tissues, or even from carbohydrates, but the most common belief is that they are derived from fats. Dr. Renshaw and Mr. Fairbrother, in 1919, while studying fermentation, observed that products were formed from starches which resembled closely those met with in the body in diabetes. It then occurred to them that it was not unlikely that the bacteria causing the fermentation in starches might also be at work in diabetes. Several patients were examined and in the bowel of each a germ was found capable of producing the acetone bodies. This bacillus is rod shaped and forms spores. It is anaerobic and has been given the name of Bacillus amyloclasticus intestinalis. In all, nine cases of diabetes have been examined, and in seven of them this germ was found. The authors draw attention to the fact that the acetone bacillus, which was used during the war, was believed to thrive on decaying vegetable matter. Northrup isolated Bacillus acetoethylicum from bad potatoes. Also jute retting is assumed to be due to a similar organism, and it appears somewhat more than a coincidence that diabetes is of comparatively frequent occurrence among the jute workers of Dundee. The authors state that as it occurs on decaying vegetable matter, it is not difficult to understand how such a heat resisting, spore forming organism should enter the bowel of human beings. As far as treatment of diabetes is concerned it is suggested that it may be feasible to rid the system of the bacillus by employing other bacilli to nullify its action. It is known that the fermentation which produces acetone for commercial purposes can be checked by a germ called Bacillus bolutans, and by other germs. The treatment in view is to use these to hinder the production of acetone in the human body.

Finally, Dr. Renshaw and Mr. Fairbrother declare that it does not seem improbable that such methods, combined with a diet of foods which the bacteria cannot assimilate, will prove an important factor in treatment, together with the administration of certain antiseptics.

Among other business transacted at a meeting of the Royal College of Physicians held on April 27th, the president of the college, Sir Humphry Rolleston, was appointed to represent the college at the celebration of the seventh centenary of the foundation of the University of Padua, which takes place on May 11th to 17th. Sir Frederick Andrewes was appointed a representative of the college on the Lister Institute of Preventive Medicine.

* * *

Recently there has been a good deal of discussion, some of it verging on the acrimonious, with regard to the comparative knowledge and skill of the specialists of Harley Street, the London sanctuary of the foremost physicians and surgeons, and the all round practitioners. It was argued that, as a rule the advice and treatment of the specialist was not worth the high fee charged, and that in many cases the ordinary practitioner would do the patient quite as much good at a tithe of the cost. It was further pointed out that the public was beginning to recognize this fact and that in consequence the consultants were suffering severely from the financial view. While it is agreed that specialism may be overdone and too high charges made, it is obvious that a man who has made a specialty of a disease or types of disease knows more about the subject than a man who has not gone into the question so deeply. Some of the later letters deal with a phase of medicinal and surgical treatment which has long called for reform in this country.

As a correspondent to the *Times* points out, the real crux of the problem is the lack of hospitals for the middle classes, or of well run private clinics which should take the place of our present hopeless system of expensive, inadequate nursing homes. Places are needed where patients suffering from difficult or obscure maladies can be treated and every investigation made for an inclusive fee. The writer goes on to say that a man does not just "choose to set up as a consultant" as one of the correspondents stated. There is a straight and narrow way that a man must follow if he wishes to become a consultant. It seems that the two great qualities in a doctor that are needed are knowledge and honor. Strangely enough, there appears to be an inveterate tendency amongst the public to hanker after the irregular form of practice. To the quack people will pay large sums gladly. This letter ends by saying that being in Harley Street is not all "sitting on your seat raking in the guineas" and the following will serve for the biography of many a consultant. The "Inter. B. Sc." from school, a scholarship to Oxford or Cambridge, prizes, and a high place in honors at the end of his career there. Then to a hospital in London to study clinical medicine for some years, perhaps dispensing for a doctor in the evenings in return for board and lodging, and giving some ill paid lectures in physiology or some other subject. Then after qualifying, a house physicianship at his hospital and then for years doing such appointments as unpaid clinical assistant in various special departments and special hospitals to learn a little more of the difficult art of medicine, keeping his head above water by doing periodical "locums" in private practice, at the same time working for higher examinations. He has indeed to "scorn delights and live laborious days." Finally, having acquired the necessary degrees and qualifications, getting on to the staff of a hospital, an honorary appointment—like all the others, and in the waiting period, after a heavy day's work, coaching and coming home at night often exhausted and almost too tired to do the reading that is necessary to keep abreast of the advance continually being made. Slowly, very slowly his practice comes, but if he makes good, it comes, as a rule, surely. The truth really is that medical practice in this country is changing in character and will undoubtedly continue to change. Of course, specialists will always be in request, but not so much as formerly.

There is a pressing need for nursing homes for those with limited means, or all the hospitals should have paying wards in which patients could be treated and charged according to their incomes. Moreover, the trend of present day medicine is towards prevention rather than cure. Prevention by good sanitation, hygiene, diet and so on, and prevention by Sir James Mackenzie's methods, that is, the diagnosis of early symptoms of disease, and preventing these symptoms from developing.

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From June 1st to 4th a Congress was held in Paris, organized by the *Ligue Francaise d'Hygiène Mentale,* and under the patronage of the President of the French Republic. The following were the principal subjects discussed: General Principles of Treatment of the Psychopath, introduced by Dr. Antheaume; Occupational Selection in Relation to Mental Hygiene, introduced by M. Lahy; Educational Methods and Applied Psychology, introduced by Prof. Claparède; An International Understanding for the Furtherance of Scientific Research Into Mental Hygiene, introduced by Prof. Rabaud; and Mental Hygiene in the Family, introduced by Dr. Toulouse. The general secretary of the Congress is Dr. Genil-Perrin, Paris.

* * *

The Rockefeller Foundation has acquired recently, on the recommendation of the Minister of Health, a site in Bloomsbury for the proposed London School of Hygiene. The site adjoins the land reserved by the Government for the new buildings of the University of London.

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Norwich, the capital of the Eastern Counties of England, is one of the oldest cities in the kingdom. In the time of the Normans, London, Bristol and Norwich were the chief cities of the country. Its cathedral was commenced during the reign of Henry I by Hubert de Losinga. Its castle was built before this time. In more recent times Norwich has been renowned for its medical men. Sir Thomas Browne died in Norwich and a succession of skilful surgeons and of erudite physicians have followed. Norwich posse ses a large and well equipped modern hospital, which, it may be remarked, affords a conspicuous example of what can be effected by means of good organization and common sense methods of management. A contributory scheme has been evolved by Dr. Samuel Barton and others whereby the financial affairs of the institution are being placed on a sound basis. A scheme for the amalgamation of the Norwich Hospital and the Norwich Eye Infirmary is about to be carried out. During the pas. quarter the number of in patients admitted to the Norwich Hospital was 93 discharged soldiers, against 103 in the same period last year, and 655 civilians, against 605. The number of operations performed was 694; 900 new patients were treated, and 450 accidents and casualties. In the corresponding period of last year these figures were 522, 791, and 1,650 respectively. As said before, the finances of the hospital are in a satisfactory condition, the donations for last year having amounted to £11,000, nearly double the amount of the previous year. At the present time about 360 parishes, 161 county firms and 450 city firms are contributing to Hospital Saturday and Sunday Fund. When the amalgamation with the Eye Infirmary becomes an accomplished fact it is proposed to utilize the present Eye Infirmary building, which is just across the road from the Norwich Hospital, as additional accommodation for nurses. The Norwich Eye Infirmary has now completed 100 years of work, having been founded in 1822.

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At a meeting of the section of tropical diseases and parasitology of the Royal Society of Medicine on April 3d last, Dr. M. Khalil read a paper on the earliest account of pellagra in Egypt. He revived a long forgotten publication by an Arabian physician, Ahmed Ibu Hassan El Rassidy, to whom credit was due for the earliest description of pellagra in Egypt, which had appeared in the first volume of *Diseases of the Skin,* Cairo, 1886. Pellagra, though first described in Spain in 1735 by Casal, who published his account in 1762 under the title of *Mal de la rosa,* was probably recognized so far back as 1578 in the health regulations of Milan, as *pellarella.* In Italy, Frapolli, in 1771, first named the disease "pelagra," synonymous with the "Alpine scurvy" described by Odoardi in 1776. Its recognition in France followed in 1818, in an account by Hameau of cases occurring in the plain of Arcachon, published in 1829. In Egypt, however, priority of description of the first occurrence of the disease there had hitherto been given in all textbooks to Pruner in his *Topographie Medicale du Caire,* in 1847, whereas that review had been preceded and possibly inspired by Ibu Hassan's original account published in the previous year. Dr. Khalil quoted in detail from the Arabian author's report of the disease, under its various synonyms, characterized by an erythematous condition of the skin, which might become scaly and bulbous, or by the development of nerve lesions without evidence of skin eruption. It was mentioned as common among the poor, and known as a poverty disease associated with the eating of maize, underfeeding, exposure to sun and insanitary conditions. The treatment advocated was mainly dietetic and included attention to improved hygiene and housing, and avoidance of sun exposure. It is interesting to note that although nothing was known concerning the rôle of vitamines at the time, yet pellagra was regarded as a deficiency disease.

Book Reviews

ELECTROTHERAPEUTICS.

The Principles of Electrotherapy and Their Practical Application. By W. J. Turrell, M. A., D. M., B. Ch. (Oxon.), D. M. R. and E. (Cantab.), Consulting Physician, Oxford County and City Mental Hospital; Physician in Charge of the Physiotherapy Department, Radcliffe Infirmary, Oxford, etc. Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton, 1922. Pp. xi-276.

In this book the author has given a scientific consideration of the uses of the various electrical methods dealing with the actions of the different modalities with respect to their distinctive effects—thermic, electrolytic, and mechanical. He has given the subject a broad and scientific consideration, devoting comparatively little space to the description of apparatus. He has considered the subject especially from the point of view of therapeutic indications. In his consideration of the constant galvanic current the writer has shown by experiments that the older views concerning deep ionic medication which has been so widely held are physically impossible. He has recognized in this work the great value of the static current as a therapeutic measure, and in the chapters on therapeutics he has outlined definitely and scientifically the administrations of the modalities which are in accord with the views of the best authorities on the subject. Dr. Turrell has given the profession a work which will add very materially to the clarification of what has been a moot subject, clearly outlining and describing methods which are scientific and practical, basing his observations upon clinical experience. The work should be read by all the members of the profession who seek enlightenment on this subject of increasing importance and significance.

NONSPECIFIC THERAPY.

Protein Therapy and Nonspecific Resistance. By William F. Peterson, M. D., Associate in Pathology, University of Illinois, College of Medicine. With an Introduction by Joseph L. Miller, M. D., Professor of Medicine, Rush Medical College, University of Chicago. New York: The Macmillan Company, 1922. Pp. xvii-314.

This interesting volume is an attempt to summarize our present knowledge in this field from every angle. It includes an historical survey of the early steps in nonspecific therapy, as well as the more modern means employed in its application in chronic diseases as developed in the past seven years. The methods used at the bedside for therapeutic ends have been described in detail, not for the purpose of popularizing them, but, as the author states, "for the purpose of stimulating interest in a direction that seems to offer decided possibilities of advance." Nonspecific therapy deals largely with activation of potential forces of the organism which have been held in abeyance in overcoming disease processes. This is evidenced by the fact that there is an increase in the antibody formation (agglutinins, precipitins, opsonins), as well as fibrinogen and thrombokinase, as has been repeatedly observed. Whether these are brought about by vaccines heterologous in nature, secondary proteoses or various other proteins, such as milk, for example, makes little difference. The end result is the same—plasma activation. Naturally such methods should be effective, as the author suggests, so long as the body is in a fit state to respond to the stimulation.

Numerous and detailed examples are cited of diseases in which nonspecific therapy has been employed. Theories that have been advanced in explanation of the modus operandi of this type of therapy in the diseases under discussion, are fully analyzed. An appendix of the various proteins and their split products has been embodied at the end of the book, which is written in a very readable form. The abundant bibliography which will prove of great value to the immunologist as well as the student of general medicine, forms a notable feature of this very important as well as interesting monograph.

SUBMUCOUS RESECTIONS.

The Submucous Resection of the Nasal Septum. By W. Meddaugh Dunning, M. D., Consulting Otologist, Fordham Hospital; Consulting Otologist to Manhattan State Hospital; Consulting Laryngologist, Ossining City Hospital, etc. New York: Surgery Publishing Company, 1921. Pp. viii-97.

This booklet is a concise and greatly condensed compilation of practical points on the submucous resection of the nasal septum, and as such presents considerable interest to the active rhinologist. The value of the work is markedly enhanced by the fact that it embodies the results of the author's personal experience extending over a period of many years, embracing thousands of cases. We fully concur in his statement that the operation is to be recommended in but twenty to twenty-five per cent. of cases of septal deviation, and we wish this fact could be impressed on the minds of many of the younger rhinologists who often, in their eagerness to operate in all cases of septal deviation, show a veritable furor operativus. It is because of the latter that this useful operative procedure, which in properly selected cases gives brilliant results, is in danger of falling into disrepute. The many illustrations help greatly in elucidating the text.

TECHNIC OF DENTAL SURGERY.

Operative Dental Surgery. By J. B. Parfitt, L. R. C. P., M. R. C. S., L. D. S., Dental Surgeon and Lecturer on Operative Dental Surgery at the Dental School of Guy's Hospital. London: Edward Arnold & Co., 1921. Pp. 313.

In this attractive little volume, the author presents the substance of a short course of lectures delivered by him to the students of the Dental School of Guy's Hospital. In this work he has aimed to present a coherent body of technical methods of proved clinical value rather than to produce a treatise on dental surgery and pathology. A perusal of the work leads to the opinion that the author has succeeded in producing the kind of work he intended to produce. There are interesting and useful chapters on scaling, the control of the saliva, the operation of filling, pain saving in filling teeth, inlays, crowning, and many other practical subjects of a technical character. That there is nothing new in this book that will startle American dentists goes without saying, but it is filled with useful teaching matter, which will be of interest to the practical dentist.

PULMONARY COMPLICATIONS OF INFLUENZA.

Studies in Influenza and Its Pulmonary Complications. By D. BARTY KING, O. B. E., M. A., M. D. (Edin.), M. R. C. P. (Lond. and Edin.), Physician to the Royal Chest Hospital, London; Consulting and Examining Physician to the Church Army Sanatorium for Children Suffering from Pulmonary Tuberculosis, Fleet, Hants, etc. With Thirty-one Illustrations. New York: Paul B. Hoeber, 1922. Pp. 88.

This volume comprises three special studies of influenza; the first an outbreak among one hundred and fifty malarial patients; the second is a followup of the acute pulmonary complications, and the third, an account of the pandemic (1918-19) as it affected the nursing staff of the Horton War Hospital, London. All these studies are carefully made and deserve to rank among the best of numerous monographic studies of the pandemic and subsequent outbreaks in various quarters of the world.

DISEASES OF THE EYE.

Medical Ophthalmology. By R. FOSTER MOORE, O. B. E., M. A., B. Ch. (Cantab.), F. R. C. S., Assistant Ophthalmic Surgeon, St. Bartholomew's Hospital; Surgeon, Moorfields Eye Hospital. With Eighty Illustrations. Philadelphia: P. Blakiston's Son & Co., 1922. Pp. viii-300.

In this little volume an attempt has been made to give a concise account of those pathological conditions of the eyes and their connections which, for the most part, are of interest in general medical diseases. On the whole it has been done extremely well, but the presentation is of necessity insufficient and incomplete. Such subjects as ocular tuberculosis, toxic amblyopia, vision and pituitary disease, the eyes and vitamine deficiency, ocular immunology, cannot be finished off in a paragraph or even a few pages. Still, Moore gives us a deal of interesting and valuable information, an excellent index, and very full reference notes to the literature on each topic. The chapters on arteriosclerosis, migraine, pituitary disease, and the neuropsychology of vision are particularly good.

DISEASES OF THE EAR.

Diagnostik und Therapie der Ohrenkrankheiten. Ein Hilfsbuch für den praktischen Arzt. Von Dr. CONRAD STEIN, Privatdozent für Ohrenheilkunde an der Wiener Universität. Bonn: A. Marcus & E. Weber's Verlag, 1922. Pp. viii-276.

The German reading general practitioner will find this an instructive and practical exposition of all he needs to know of diseases of the ear. Contrary to the general run of German textbooks this one is devoid of verbosity, and is written in an easily understandable and clear literary style. The author occupies himself exclusively with the diagnosis and therapy of various otological conditions, and for better reference arranges his material in accordance with the symptoms as encountered in practice, thus: Pain in the ear, its varieties due to diseases of the ear itself, to diseases of the neighboring organs, and to general systemic conditions; discharge from the ear in various acute and chronic conditions; defective hearing—a particularly interesting chapter—occurring in diseases of the external, middle and inner ear, and due to neuroses and cerebral conditions; dizziness and disturbances of equilibrium, fever, headache and so on. This is a serviceable plan, inasmuch as it aids the reader materially in orienting himself in a maze of symptoms that sometimes baffle the skill of even the trained aurist. The author has succeeded in the rather difficult task of definitely pointing out the limits beyond which the general practitioner should not go in treating ear cases, and the frequently repeated warnings in that respect form one of the interesting features of this instructive book.

INFANT FEEDING.

Infant Feeding. By CLIFFORD G. GRULEE, A. M., M. D., LL. D., Associate Professor and Acting Head of the Department of Pediatrics at Rush Medical College; Chief of Pediatric Staff, Presbyterian Hospital, etc. Fourth Edition, Thoroughly Revised. Philadelphia and London: W. B. Saunders Company, 1922. Pp. 397.

It is five years since the appearance of the third edition of this book, and during that time there have been not a few events and many novelties, but not so many permanent advances in the field of pediatrics. All, however, good as well as bad, receive mention here, even the Nem system of von Pirquet. Wisely, however, the author does not devote much space to a description of that. While the title of the book is correct it is somewhat misleading. To the ordinary reader "infant feeding" calls up a picture of top milk, malt soup, flour balls, albumin milk, milk sugar, and a host of proprietary foods, and one wonders how a four hundred page book can be filled with such material. There is more than this, however, for the author discusses at great length the dietary management of spasmophilia, the nervous infant, rickets, eczema, and a number of other diseases and conditions of early life. The family physician and the young pediatrist will find Dr. Grulee's excellent treatise very helpful when puzzling cases of nutritional disorders in early life present themselves.

PROSTITUTION AND TUBERCULOSIS.

Prostitution und Tuberkulose. Klinische und socialmedizinische Untersuchungen. Von Dr. I. W. SAMSON, Berlin. Leipzig: Georg Thieme, 1921.

To review this monograph for a medical journal in the United States, where there is virtually no regulation of prostitution, would seem to be superfluous and yet one cannot but feel that the subject is an important one. In his preface the author expresses his regret that while professional prostitutes are carefully examined for venereal infections and can be forcibly retained until their recovery, the law does not permit any regulation in regard to tuberculosis, no matter how far advanced the disease may be. Concerning the frequency with which tuberculosis is found, the author quotes Spillman who maintains that about forty per cent. of the professional prostitutes in France die of tuberculosis.

Concerning the character of the infection the percentage among the tuberculous prostitutes does not differ materially from any others. The author gives 93.4 as afflicted with tuberculosis in the pulmonary form and 5.7 in other organs. The age at which the prostitute is seemingly in greatest danger of contracting tuberculosis is between twenty and twenty-five years. Out of 1,300 prostitutes examined, 368 were found tuberculous between the ages twenty and twenty-five who had plied their profession from one to five years; eleven at the same age had plied their profession from five to ten years. Between the ages of twenty-five and thirty, 240 were found tuberculous who had plied their profession from one to five years, and 132 from five to ten years. From the statistics it would seem that the majority rarely lived longer than thirty-five years.

Interesting is the author's conclusions that the syphilitic invasion in the tuberculous prostitute does not necessarily influence the tuberculous process to any appreciable and unfavorable degree. He admits, however, that if there exists any favorable influence in such instances it can be explained in the cases of the professional prostitute by the fact that if she is found luetic she is immediately forced to undergo an antisyphilitic treatment and it may be that the more regulated mode of life and their previous occupation free from physical strain, accompanied by usually good nourishment, is the cause of the relatively mild run of the disease. Concerning alcoholism the author maintains that it should be considered the result rather than the cause of prostitution. The author's opinion concerning alcohol and tuberculosis is also interesting. He maintains that they run side by side without influencing each other. Concerning the smoking habit and its results on the tuberculous prostitute, he maintains that tuberculosis makes a more rapid progress in the girls who have been addicted to smoking than in those who have not. Concerning the sanitary supervision and control in general, the author concludes that in the interest of the common good, including the combat of tuberculosis, sanitary control, supervision, and care of the prostitute should not be done away with but improved according to modern conceptions.

THE STORY OF THE DRUG INDUSTRY.

The Story of Drugs. A Popular Exposition of Their Origin, Preparation, and Commercial Importance. By Henry C. Fuller. Illustrated with Photographs. New York: The Century Company, 1922. Pp. 358.

The tendency of the age toward intellectual democracy—even though some of us have to confess to a rather rude disappointment, in this postwar period, in the realization of our ideals of social, economic and political democracy—is demonstrated in the increasing publication of books on technical subjects, treated in popular form to satisfy the growing demand on the part of the layman for a deeper knowledge of scientific and professional subjects. The Story of Drugs, by Mr. Fuller, who, the publisher's jacket states, is on the staff of the Industrial Research Laboratories, Washington, D. C., is an addition to this ever increasing list of popular works on technical subjects. The author states that the book is not intended as a scientific treatise, but as a presentation, in plain, everyday terms and phraseology, for the lay person, of the story of the drug industry, based upon diversified nonscientific inquiries. First, the book tells what drugs are and where they originate; this is followed by an historical sketch of the development of the medicine making industry; and finally there is a detailed account of how medicines are made. An appendix—of doubtful value—is entitled The Family Medicine Chest, or Household Armamentarium. Matters of a controversial nature have been excluded.

The book has a profusion of interesting and attractive illustrations from photographs. In the section on patent medicines, the writer states that he proposes to draw a definite line between the old fashioned well established remedies, which have really benefitted many, and the sensationally advertised cures and medicines of a recognized pernicious nature. The book certainly gives the impression, however, that Mr. Fuller's attitude of receptivity toward the latter is very broad. We are rather shocked to discover Pinkham's vegetable compound and wine of cardui in the list for the family medicine chest. Also, Fuller declares that "the old line liquid remedies contained no more alcohol than is necessary to keep the medicinal agents in solution and prevent spoilage . . ." this in the face of the definite establishment of a large alcoholic content in the case of the original peruna, wine of cardui, vinol and other patent remedies.

But in spite of this and a number of inaccuracies, the book contains much of interest and instruction for the layman.

SOLUTIONS.

Solutions. In Ten Lessons. A Manual for Use in Training Schools for Nurses. By Elsie M. Smith, R. N., Superintendent of Nurses, Fresno County Hospital, Fresno, Cal. Second Revised Edition. St. Louis: C. V. Mosby Company, 1922. Pp. 59.

The first edition appeared in 1919 and its exhaustion has led to a second edition. There is no change in the subject matter save in the order of chapters. Among the topics dealt with are hypodermic medication, approximate equivalents and saturation, the use of decimals and the metric system in general, stock and percentage solutions, pure drug solutions, fractional ratios, proportional solutions, equivalents of drops and grams, and drop fractions.

OBSOLETE PSYCHIATRY.

Advanced Suggestion. (*Neuroinduction.*) By Haydn Brown, L. R. C. P., etc. (Edin.); Fellow of the Royal Society of Medicine. Second Edition. New York: William Wood & Co., 1922. Pp. xviii-402.

There are many good points in this book of Brown's but he finally gets into such a muddle when he discusses treatment that the book from a practical point of view is worthless. His entire biological, psychological concept is in need of careful revision, for he has clung so tenaciously to obsolete ideas and methds and disregarded modern dynamic psychopathology so completely, that his present presentation is quite hopeless. Brown is so certain about so many things that are not so.

PROTOZOA.

An Introduction to the Study of the Protozoa. With Special Reference to the Parasitic Forms. By E. A. Minchin, M. A., Ph. D., F. R. S., Professor of Protozoölogy in the University of London. Illustrated. New York: Longmans, Green & Co.; London: Edward Arnold, 1922. Pp. xi-517.

This book, while not intended primarily for the medical man, will find favor among many who are interested in the biological and morphological aspects of protozoa. The presentation stands midway between the purely theoretical and the purely practical. The literature has been freely consulted and quoted. It is a careful piece of work and it is to be regretted that the printing is not of a better quality.

MEDICAL TREATMENT.

The Principles of Medical Treatment. By GEORGE CHEEVER SHATTUCK, M. D., A. M., Assistant Professor of Tropical Medicine, Harvard Medical School. Fifth Revised Edition, with Contributions by Members of the Staff of the Massachusetts General Hospital. Boston: W. M. Leonard, Inc., 1921. Pp. 309.

Of this well known volume it is only necessary to say that to the fifth edition the following contributions have been added: Tuberculosis, by John B. Hawes, 2d; Acute Infectious Diseases Most Common in Childhood, by Edwin H. Place; Influenza, by Gerald Blake; Diabetes Mellitus, by Benjamin H. Ragle; Serum Treatment of Pneumonia, by Henry M. Thomas, Jr. All these contributors are members of the staff of the Massachusetts General Hospital. Dr. Chattuck expresses a hope that the book in future editions, will continue to reflect the hospital's clinical activities.

ENDOCRINOLOGY IN THE STUDY OF PSYCHIATRICAL CASES.

A Psychoanalytic Study of Psychoses with Endocrinoses. By DUDLEY WARD FAY, Ph. D. Nervous and Mental Disease Monograph Series No. 33. New York and Washington: Nervous and Mental Disease Publishing Company, 1922. Pp. viii-122.

This, the thirty-third monograph of the series, is devoted to a series of case histories wherein psychic and endocrinological disorders appear in the same patient. An attempt is made to prove the interrelationship of the disorders. It is scarcely a fair test inasmuch as the material handled presented marked and combined pathological conditions. It contains certain suggestions of value but on the whole lacks a concrete or conclusive presentation. It would seem that a task of this kind should be done far more thoroughly but undoubtedly the limitations of doing the work in an institution limited its scope.

PSYCHOLOGY IN FICTION.

Life and Death of Harriet Frean. By MAY SINCLAIR. New York: The Macmillan Company, 1922. Pp. 133.

The Combined Maze. By MAY SINCLAIR, Author of *The Divine Fire.* New York: The Macmillan Company, 1922. Pp. 394.

The kaleidoscope of human lives that Miss Sinclair illuminates is truly amazing and never ending. Intricate yet inevitable patterns shift and melt into other colorful situations before our eyes. She has always been a painter of reality, her stories enhanced by those strange quirks of fate that begin and end with the individual, mould him and wreck him on the shoals where his life meets other lives. Miss Sinclair's latest novel is a miracle of condensed, poignant achievement. It thrusts true, so deadly true that it is almost painful to the majority of readers. Harriett Frean was brought up according to the tinselled and drossy Golden Rule of "Behaving Beautifully." The modern generation is only just beginning to venture into the outer darkness of personality and individuality after countless decades of obedience to these precepts. Needless to say Harriett Frean starves mentally and psychically, patterns her entire life after her mother's neurotic, repressed life. She never allows herself to live her own life; it might not conform with what was expected! Even her death is provided for, not individual, but the death her mother died. The relentless sweep of the story is too powerful for comfort. It is the stark naked truth, blinding in the fierceness of its light.

The new edition of *The Combined Maze,* a novel in her earlier style, tells the story of a love life gone astray. It is the history of a commonplace trio, somehow touched by romance and beauty in the midst of sordid endurance. It also rings true with that extraordinary all-knowingness of Miss Sinclair's. It is a delightful and pitiful tale of happiness frustrated by the demon of public opinion.

DANISH LITERATURE.

Guest the One-Eyed. Translated from the Danish of Gunnar Gunnarsson, by W. W. WORSTER. New York: Alfred A. Knopf, 1922. Pp. 340.

The days of Viking prowess, so dear to the imaginative reader discontented with humdrum present existence, fade before this powerful and romantic drama of Iceland of today. The secret of Gunnarsson's writing, like that of so many other Scandinavians, seems to be his familiarity with the human heart, whether beating in antiquity or now. His heroes live and are forever clothed for us in actuality.

Guest the One-Eyed is the story of three generations of Icelanders, a keen survey of psychological conditions, relations between landowner and peasant, a fragment of the life of the island. There is uprightness and deceit, there is tragedy. Large and small the conflicts of an average human life crop up, are bested, or produce the inevitable changes. Gunnarsson has given to this book the same spirited fire that made *The Sworn Brothers* notable. He has laid the glamor of romance over everyday life, just as he gave the flavor of reality to life in ancient times.

Medicoliterary Notes.

Now that "hiking time" is here again, the physician interested in attractive walks and Sunday outings will do well to remember the very interesting and attractive pamphlet, *Palisades Interstate Park,* published last year by a member of the medical profession, Dr. Robert L. Dickinson. It is by far the best guide to the Hudson River region north of New York and contains all kinds of interesting and useful information about the Palisades. The booklet is illustrated by clever sketches by the author, and with clear and accurate maps showing all roads, trails, ferries, etc. The pamphlet may be purchased from the American Geographical Society, Broadway and 156th Street.

* * *

Irrespective of whether or not *The Hairy Ape* deserved the criticism it has recently received, the play is certainly one of Eugene O'Neill's best, although it seems inferior to *The Emperor Jones* both as to dramatic form and production. It is too full of repetition, and Louis Wolheim, who plays the title rôle, is by no means a great actor. Yet from a social and ethical viewpoint, it is probably the most significant of the O'Neill plays. *The Hairy*

Ape, a brutish, illiterate stoker, symbolizes the "underpinning" of the industrial structure on which the whole of modern society rests—in fact, the play is all pure symbolism—and the action develops the idea of the enormous danger in society's present willful disregard and neglect of this low and unthinking, because neglected, laboring class.

* * *

Broom is the curious name of a periodical published in Rome by Americans in Italy. The April number contains an interesting article by Jean Epstein entitled The New Conditions of Literary Phenomena. The writer says: "Life is so cerebral and intense that it is logical to foresee signs of intellectual fatigue. It is not a question of malady but a modification of the most sensitive organism, because the commanding organism, the brain. . . . A light fatigue, this health colored with fatigue, universal in the measure that civilization is universal, not pathological, since it is not exceptional in the new state of health. . . . But such as it is, it is clearly indicated in the civilized literatures of modern countries."

* * *

Colonel Henry Beeuwkes, M. D., now with the Medical Division of the American Relief Administration, reports that codliver oil tanks are being circulated through Moscow, stopping in front of nurseries and children's homes. The children shout with glee when they see the tanks coming, and those sick in hospitals beg for the oil. Many suffering from malnutrition and skin and scalp diseases have already been greatly benefited.

* * *

The *North American Review* for May contains a clever and amusing essay on heredity called Our Clamoring Ancestors, by Agnes Louise Dean. In the same number is an article on Mental Tests for Immigrants, by Dr. Arthur Sweeney, professor of medical jurisprudence at the University of Minnesota. The writer advocates most strongly the application to immigrants of the psychological tests used by the army during the war.

* * *

Hearst's International Magazine for May contains a translation of a hitherto unpublished story of Guy de Maupassant, the manuscript of which was recently discovered among the personal papers of the late French author. The title is The Story of a Wise Man, and the tale is a curious and interesting study in psychopathology which, to the psychoanalyst, doubtless throws much light upon the mental disease that afflicted De Maupassant's last years.

* * *

In *Mental Hygiene* for April is a most interesting and illuminating article by the late Dr. Pearce Bailey on the Mental Pathology of Races in the United States, reprinted from the *Archives of Neurology and Psychiatry* for February. The paper contains a number of very valuable statistical tables.

* * *

Still another theory about Hamlet! James Westfall Thompson, in the May number of the *North American Review,* argues that Shakespeare in Hamlet was specifically aiming at the notorious relations between Queen Elizabeth and Robert Dudley, Earl of Leicester, and that the play revolves around the mysterious death of Leicester's first wife, Amy Robsart. This new point of view is interesting as compared with the revival last winter in a magnificent screen version of the play by one of Denmark's most noted actresses, Alta Nielsen, of the legendary theory that Hamlet was really a woman, whose sex was concealed by her parents so that succession to the throne might be assured.

New Publications Received.

BISEXUAL LOVE. By W. Stekel. Boston: Richard G. Badger, 1922. Pp. viii-359.

DISGUISE OF LOVE. Psychoanalytical Sketches. By W. Stekel. New York: Moffat, Yard & Co., 1922. Pp. vi-171.

RADIUM THERAPY. By Frank Edward Simpson, A. B., M. D. St. Louis: C. V. Mosby Company, 1922. Pp. 391.

THE PLACE OF VERSION IN OBSTETRICS. By Irving W. Potter, M. D. St. Louis: C. V. Mosby Company, 1922. Pp. 138.

L'ENCEPHALITE LETHARGIQUE. Par le Pr. Achard. Avec 15 figures. Paris: Librairie J. B. Balliere et Fils, 1921. Pp. 324.

MEDICAL OPHTHALMOLOGY. By R. Foster Moore, O. B. E., M. A. Philadelphia: P. Blakiston's Son & Co., 1922. Pp. viii-300.

MANAGEMENT OF THE SICK INFANT. By Langley Porter, B. S., M. D., and William E. Carter, M. D. St. Louis: C. V. Mosby Company, 1922. Pp. 654.

TRANSACTIONS OF THE AMERICAN ASSOCIATION OF GENITO-URINARY SURGEONS. Volume XIV. Baltimore: William & Wilkins Company. Pp. xi-267.

UNITED STATES LIFE TABLES, 1980, 1901, 1910, and 1901-1910. Prepared by James W. Glover. Washington: Government Printing Office, 1921. Pp. 496.

OLD EUROPE'S SUICIDE, OR THE BUILDING OF THE PYRAMID OF ERRORS. By Brigadier General Christopher Birdwood Thomson. New York: Thomas Seltzer, 1922. Pp. xii-192.

A PSYCHOANALYTIC STUDY OF PSYCHOSES WITH ENDOCRINES. By Dudley Ward Fay, Ph. D.. New York and Washington: Nervous and Mental Disease Publishing Company, 1922. Pp. viii-122.

ZUR THERAPIE DES KARZINOMES MIT RÖNTGENSTRAHLEN. Vorlesungen über di physikalischen Grundlagen der Tiefentherapie. Von Prof. Dr. Fr. Dessauer. Mit 30 Textfiguren. Dresden und Leipzig: Verlag von Theodor Steinkopf, 1922. Pp. 70.

MANUAL OF OBSTETRICS. By John Osborn Polak, M.Sc., M. D. Second Edition, Containing a Special Section on Endocrinology. New York: Physicians and Surgeons Book Company, 1922. Pp. xix-488.

AN ESSAY ON THE PHYSIOLOGY OF MIND. An Interpretation Based on Biological, Morphological, Pkysical, and Chemical Considerations. By Francis X. Dercum, A. M., M. D., Ph. D. Philadelphia and London: W. B. Saunders Company, 1922. Pp. 150.

THE OXFORD MEDICINE. By Various Authors. Edited by Henry A. Christian, A. M., M. D. In Six Volumes. Illustrated. Volume V: Infectious Diseases (continued) and Diseases Due to Animal Parasites. Volume VI: Diseases of the Central Nervous System. Under the Editorial Supervision of Sir James Purves Stewart. New York: Oxford University Press, 1921. Pp. xvii-1099.

Practical Therapeutics

AN ESOPHAGEAL DILATOR.

By J. Buckstein, M. D.,

New York.

This apparatus consists of the following four essential parts.

Perforated end piece.—This is a small, rounded end piece, with two small openings, through which a thread may be passed, along which the passage of the dilator may be guided through the cardiac opening. Where marked stenosis at the cardia with secondary dilatation of the esophagus exists, the unguided dilator may be pushed to one side of the cardiac opening and fail to gain entrance into the stenosed or spastically contracted area. Under such conditions it is best for the patient to swallow a string for a sufficient length so that after gaining entrance into the stomach, it passes beyond it well into the jejunum where it becomes anchored. The end of the string extending from the mouth is then passed through the openings in part I, and with the string held taut, the dilator is guided through the esophagus along the course of the string

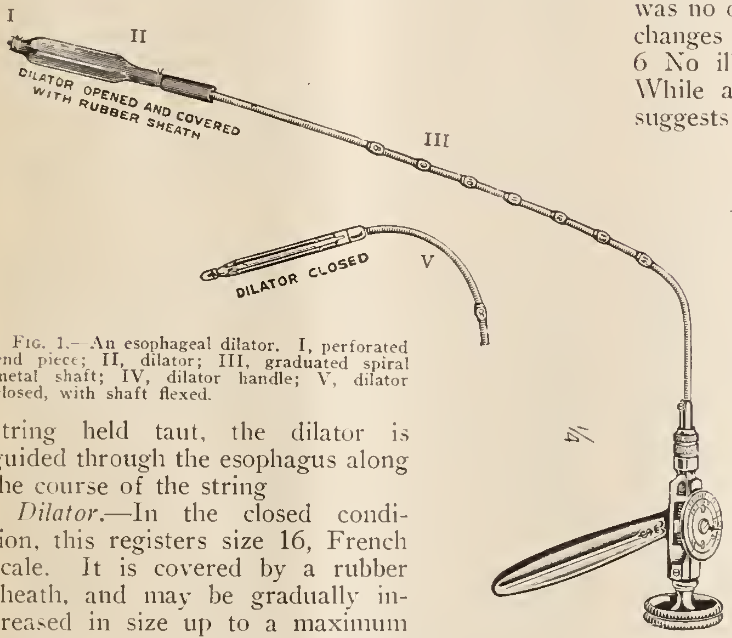

Fig. 1.—An esophageal dilator. I, perforated end piece; II, dilator; III, graduated spiral metal shaft; IV, dilator handle; V, dilator closed, with shaft flexed.

Dilator.—In the closed condition, this registers size 16, French scale. It is covered by a rubber sheath, and may be gradually increased in size up to a maximum dilatation registering 50 French.

Shaft.—This is made of spiral metal. With the exception of the last few inches of the shaft which are at an angle to the main body, this shaft is flexible to a high degree as indicated by figure V in the accompanying illustration. There is an extreme advantage in this ready flexibility of the shaft, as it enables the instrument to be passed through the esophagus with maximum ease and comfort to the patient. In this respect, it has an unquestioned advantage over those instruments in which the shaft is rigid and unyielding. In addition the shaft is graduated, so that the distance of the stenosed or spastically contracted area from the teeth can be determined.

Dilator handle.—This is based on the model of the Kohleman dilator handle and exact registrations of the increase in size of the dilator can be determined. In this manner a record may be kept of the progress in the degree of dilatation obtainable, as treatment is continued.

The advantage of the apparatus lies in the combination of features, as outlined above, in a single instrument.

1 West Eighty-fifth Street.

Treatment of Malignant Disease by a Diet Free from Fat Soluble Vitamine A.—Stanley Wyard (*Lancet, April* 29, 1922) tried a diet free from fat soluble vitamine A in twenty-one malignancies for three months or more and drew the following conclusions: 1. There was no demonstrable effect on the growth and evolution of the tumor. 2. The general condition of the patient showed no unfavorable change attributable to the diet. 3. Whether the diet affected the amount of pain or not is doubtful—usually not. 4. All the blood counts were within normal limits of variation and there was no diminution of the lymphocytes. 5. No bony changes (other than secondary deposits) were found. 6 No ill effects of any kind were demonstrable. While all these findings are negative, the author suggests trying these experiments on patients in whom the growth, while small and not extensively infiltrating, is yet inoperable because of its location; or when the growth is small and in itself inoperable but operation is refused or the general condition forbids it.

A Review of the Work Done by the Glasgow School on the Etiology of Rickets.—Leonard Findlay (*Lancet,* April 29, 1922) asserts that defective hygiene in the widest sense of the term is the most important determining factor in the causation of rickets; confinement and lack of exercise were experimentally proved important factors in animals and infants. Investigation of the housing conditions showed that the rachitic cases suffered from a reduced air space and poor maternal care. The diet and the family income played a very minor part; the socalled antirachitic vitamine fat soluble A has no bearing on the development of rickets. Infection is not responsible. The experiments with fat poor and fat rich diets do not show uniform results: many infants on a fat poor diet never develop rickets, while some of the severest cases occurred with fat rich diets; fat digestion and absorption are as good in rickets as in health. Sunshine and fresh air cured many cases of rickets without a change in diet. Codliver oil and phosphorus do not hasten the healing. Ultraviolet rays produced the most rapid improvement. Codliver oil shows healing effects in the röntgenogram but none clinically. Calcium starvation does not produce the disease. Confinement and lack of exercise seem to play the most important part.

The Use of Phenol Red as an Indicator for Milk and Sugar Media.—H. C. Brown (*Lancet,* April 29, 1922) recommends phenol red milk as a substitute for litmus milk as an indicator for acid or alkali production in bacterial cultures. One part of condensed milk is added to four parts of tap water; to five c. c. of this mixture a few drops of phenol red solution are added and then N/10 sodium hydrate solution is run in until the mixture becomes brick red; the calculated amount of N/1 sodium hydrate solution is then added to the diluted milk and sufficient saturated aqueous solution of phenol red to make the milk a vivid brick red. Care must be taken to stop the addition of alkali when the brick red color is reached, corresponding to a pH 7.5. The subsequent production of acid or alkali by any organism in this medium will be clearly shown. The medium is then tubed and steamed for twenty minutes on three successive days. This method is more sensitive than litmus and an initial acidity which is followed by alkalinity, as with Bacillus paratyphosus B is clearly shown. The same applies to the use of sugar media.

Mercurial and Salvarsan Dermatitis Appearing During the Course of Antiluetic Treatment.—Josef Klaar (*Kiener klinische Wochenschrift,* March 23 and 30, 1922) reports a series of cases with necropsies, in which the cause of death was probably cardiac insufficiency, although the mechanism of the origin of the severe changes in the skin are unexplainable. Preexisting lesions of the liver or large doses of salvarsan could be excluded as the cause of the development of exanthems and the intervals of treatment were sufficiently long. Usually the dermatitis appeared without premonitory symptoms and it must be explained by a specific reaction power of the organism. The idiosyncrasy is usually transient. During the dermatitis, the Wassermann reaction became negative or weakly positive in most of the cases and the luetic changes in the skin and mucosa disappeared entirely; the course of the syphilis was also favorably influenced with few exceptions. The dermatitis seems to occur more often in females than in males.

Anaphylaxis and the Thyroid Gland.—L. Kepinow and A. Lanzenberg (*Presse médicale,* May 10, 1922) refer to experiments in which they had shown that completely thyroidectomized guineapigs were able to receive injections of horse serum with impunity, without presenting any anaphylactic shock. These earlier experiments had led to the supposition that the thyroid gland was concerned in the preparation of the sensitizing substance. More recently they tried to verify this supposition by a study of passive anaphylaxis in thyroidectomized animals. The conclusions reached are that thyroidectomized animals can be passively sensitized; they present the manifestations of anaphylactic shock when, after having received serum from sensitized unoperated animals, they are given a second injection. Thyroidectomized animals do not have in their serum, after the preparatory injections, the substance which confers passive anaphylaxis to animals, whether unoperated or thyroidectomized. The thyroid gland thus appears to the authors to play a rôle of prime importance in the phenomenon of anaphylaxis.

Some Unusual Causes of Difficulty of Micturition Due to Abnormal Conditions at the Vesical Neck.—W. K. Irwin (*Lancet,* April 29, 1922) reports three unusual causes of difficulty due to narrowing of the urethral canal at the vesical neck, giving symptoms of enlarged prostate without actual enlargement, difficult to differentiate in diagnosis. 1. In the presence of a small fibrous prostate the symptoms are very similar to those of glandular enlargement, but the difficulty of micturition is greater, resembling a malignancy. The length of the urethra is diminished. On rectal examination the gland is found very small or impalpable. Scirrhous carcinoma is differentiated by the uniform smoothness and the absence of metastases in the later stages. The condition is usually too far advanced to be aided by the removal of the cause, such as stone, tuberculosis or abscess. Large metal bougies give only temporary relief and perineal prostatectomy or prostatotomy may be tried. 2. Congenital valves of the prostatic urethra are characterized by difficult micturition from infancy, resulting in retention with overflow which may be mistaken for enuresis. The treatment is dilatation with bougies, internal urethrotomy, or removal of the valve with the cautery, scissors, or best with the finger by the suprapubic route. 3. Spasm of the internal sphincter is usually described as atony of the bladder in healthy young males. There is no history of gonorrhea, no spinal disease and no abnormality of the prostate. A sound may find obstruction at the internal sphincter. The treatment consists of passing metal bougies, followed by dilatation with the Kollmann dilator up to 40 to 45.

Blood Viscosity in Morphinism.—P. Sollier (*Bulletin de l'Académie de médecine,* April 18, 1922) states that whereas, during the state of intoxication, the blood shows little in the way of morphological and structural changes, during withdrawal of the drug there is a marked increase in the red cell count as well as the leucocytes. In the first few days after withdrawal there is a polymorphonuclear leucocytosis and disappearance of the eosinophiles, while about the fifteenth there is a lymphocytosis with eosinophilia and the appearance of large macrophages and myelocytes. Meanwhile there is increased resistance of the red cells and reduced resistance of the whites. Coagulation is more rapid than normal, and there is deeper coloring of the red cells, together with the appearance of macrocytes and poikilocytes. The leucocytes present numerous changes in the nuclei and protoplasm, amounting in some instances to complete degeneration of the cell. Only about the fortieth day after withdrawal do the cell count and cell resistance approach the normal and the changes in the leucocytes disappear. The viscosity of the entire blood is increased during the period of intoxication, this increase being due to increased cellular viscosity, the viscosity of the blood plasma remaining normal. During the period of withdrawal, the viscosity increases further, again involving mainly the blood cells. By the fifteenth or twentieth day after withdrawal the viscosity approaches normal, and it reaches normal from the thirtieth to the fortieth day. Purgation and diarrhea during withdrawal do not account for the high viscosity, for the latter is due to the cells and not the plasma. Further, even the increased cell count is not enough to account for the high viscosity; there must be some other factor, which is probably the morphological and structural changes in the cells during withdrawal, the cells rubbing together much more than usual on account of their being distorted and irregular in outline. All these findings show that the clinical manifestations in morphine withdrawal are due to actual organic causes, the origin of which is somewhat similar to that in infectious diseases, and that the mental abstinence symptoms are the result of organic disturbances and not, as some still think, of a disordered mental habitus. They also suggest a possible danger in the use of hypnotics and sedatives during the period of withdrawal.

Autohemotherapy in Protracted Infectious Diseases.—F. Ramond (*Bulletins at mémoires de la Société médicale des hôpitaux de Paris,* April 13, 1922) at first based this treatment on the hypothesis that antigens in the blood cause the formation of antibodies with greater difficulty in the blood stream than they do in the subcutaneous cellular tissues. The original procedure was to withdraw twenty to forty mils of blood from a vein at the elbow and reinject it at once into the neighboring cellular tissue. Experience showed, however, that two mils was a sufficient dose, and the mode of action appears more likely to be that of a colloidoclasic shock. The treatment does not accomplish much in the earlier stages of acute infections nor in the decline in severe streptococcic or other septicemias, but in infections of a more dragging type, best exemplified in protracted typhoid fever, it generally induces a drop in the temperature and shortens convalescence by at least ten to fifteen days. If the temperature fails to drop within forty-eight hours, one more injection may be given. As a rule, sweating supervenes in twelve to twenty-four hours after the first injection; when marked, it is regularly followed by defervescence, which begins at some time between the twenty-fourth and the forty-eighth hour. Polyuria also occurs, the condition thus showing all the features of the true crisis of infectious diseases as described by Chauffard.

Addison's Disease Treated by Suprarenal Grafting.—Hurst, Tanner and Osman (*Proceedings of the Royal Society of Medicine,* May, 1922) report the case of a motor driver aged forty-one years who was admitted into Guy's Hospital for muscular weakness and pigmentation. He was soon exhausted on walking, and recently had begun to vomit after meals. The skin was pigmented all over the body, and around the nipples and genitals was almost black. There were no signs of active or healed tuberculosis, although the radiographic appearances were suggestive of old phthisis. Treatment with hydrochloric acid by mouth, suprarenal extract in large doses, and injections of one in one thousand adrenalin hydrochloride solution caused no obvious improvement. At the end of four months the systolic blood pressure had fallen to 75 mm. Hg. A suprarenal gland from a man who had just died from an accident was grafted into the subcutaneous tissue of the inguinal region. The blood pressure remained as before. About two weeks later a graft from a fetus just after death was grafted into the substance of the left testicle. The patient had been getting rapidly more anemic, and a month after the second operation the hemoglobin was but forty-three per cent. and the red cells 2,070,000. The hemoglobin continued to fall until, nearly a month after the second operation, it was twenty-eight per cent. A blood transfusion was then performed and the patient again given hydrochloric acid and iron by the mouth. He began slowly to improve, and one month later the hemoglobin was forty per cent., and the systolic pressure had risen to 95 mm. Hg. He was discharged from the hospital and returned home to attend to private affairs. Seven months later, he was feeling much better. He had not vomited for several months, but the pigmentation seemed unaltered. The systolic pressure had risen to 115 mm. Hg, and the hemoglobin percentage was 80. The suprarenal graft was still palpable, the testicle having partially atrophied.

Colloidoclasia and the Endocrine Glands.—Widal, Abrami and De Gennes (*Presse médicale,* May 6, 1922) assert that, aside from antianaphylactic procedures such as specific or nonspecific desensitization and the administration of atropine or adrenalin, there are some cases of asthma in which, anaphylaxis having developed in conjunction with endocrine disturbances, gland therapy calculated to make good deficiencies of endocrine function will so modify the system as to make it refractory to the occurrence of anaphylactic phenomena. They report in great detail the case of a woman aged forty years in whom asthma, from which she had suffered for twenty-three years, was plainly modified as to its course by variations in the functions of the ovaries and the thyroid gland. From the age of thirty years, the woman had begun to observe that certain climates made her asthma worse and that she was becoming sensitive to emanations from roses and certain other odors. When the menopause set in, at the age of thirty-seven, her severe asthmatic attacks, which had been growing increasingly frequent, completely ceased. Her more constant, slight dyspnea persisted, but was present only in the mornings, on awakening, and was accompanied by paroxysmal cough with free expectoration, frequently bloodstreaked. Furthermore, typical manifestations of myxedema set in. At the same time, sensitization to certain odoriferous agencies was still present, smelling a bouquet of roses regularly bringing on dyspnea, which began in one or two minutes and lasting several minutes; these attacks were far less violent than they had been before the menopause. Atropine prevented them, but adrenalin did not. The patient was now given 0.2 gram of thyroid gland for ten days, and then 0.3 gram. Within a few days after the increase of dosage the manifestations of myxedema began to recede, and the morning dyspnea almost entirely disappeared. In ten days the patient could smell roses without the least inconvenience. Subsequent interruption of the thyroid treatment and its resumption three successive times proved definitely that the effects witnessed were due to the thyroid. The sensitiveness to roses regularly returned when the thyroid was stopped, and at times there were asthmatic attacks such as the patient had had previous to her menopause.

Neosilversalvarsan.—K. Ullmann (*Wiener klinische Wochenshrift,* April 6, 1922) finds the silversalvarsan and neosilversalvarsan are excellent antiluetic remedies in all stages of the disease. They act powerfully and quickly and occasionally even more so than neosalvarsan, especially on the spirochetes in the chancre, the fresh lesions of secondary lues, periosteal swellings, older gummatous infiltrations, the symptom complex of hereditary lues, the luetic fetus, and occasionally on the neurorecidives of the brain, ear, keratitis and other obstinate clinical manifestations. In early latent cases, their effect on the Wassermann reaction corresponds to that of the combined mercury salvarsan treatment and it lasts a long time. Whether the silversalvarsans have any special advantage over neosalvarsan in nervous syphilis has not as yet been definitely established, but seems likely; at any rate they seem to exert a greater absorptive effect than the combined mercurial treatment. The occasionally appearing slight neurorecidives should be considered as signs of a powerful effect and not as a contraindication for the preparations. The newer preparations also show less local tissue reaction and less injurious effects on the kidney. Vasomotor irritation does not occur with the proper solution and dosage of neosilversalvarsan. The lasting effect upon the disappearance of the Wassermann reaction, even without the use of mercury, is probably due to the chemotherapeutic spirillicidal effect of the silver. The facts that the solubility relationships of the neosilversalvarsan are in no way inferior to that of neosalvarsan and that the decomposition of the solutions on exposure to air is less, make the newer preparations therapeutically equivalent if not superior to neosalvarsan. Up to the present time, experience and theory render these preparations equivalent to the other salvarsans. If mercury is not well tolerated or contraindicated and if the older salvarsan preparations are inadequate, neosilversalvarsan is indicated.

A Simple and Economic Method of Staining Blood.—J. Hickl and N. Jagic (*Wiener klinische Wochenschrift,* April 6, 1922) describe a staining technic which differentiates the various forms of leucocytes. A 1.5 per cent. stock solution of toluidin blue (Grübler) is prepared with distilled water, which keeps for a long time and should be filtered occasionally. For use, the stock solution is diluted 1:10, which also keeps for a long time. The blood smear is prepared in the usual way and dried in the air protected from dust for twelve to twenty-four hours. A drop of the toluidin solution is placed on the smear and covered with a coverglass, the smear face down and avoiding air bubbles. The smear is then examined microscopically while wet or after drying in the air. The erythrocytes are easily recognized by their contour. The leucocytes show nuclei colored blue and with a distinct structure, the granules in the protoplasm and the chromatin markings appearing distinct. The polymorphonuclear neutrophiles show distinct segmentation of the nuclei, a fact useful in Arneth's count. The nuclei of the lymphocytes, monocytes and myelocytes show their morphological characteristics. The protoplasm of the leucocytes shows all the details; this applies also to the basophiles, but not to the granulations. The strongly basophile protoplasm of the myelocytes and irritation forms is recognizable by the dark blue staining; the myelocytes show a lighter protoplasm, whereas the ripe polymorphonuclears have a lightly colored protoplasm. The same applies also to the lymphocytes and monocytes; the protoplasm of the latter appears darker than that of the polymorphonuclears. The granules of the myelocytes and polymorphonuclears appear distinctly colored. The eosinophile granules are recognizable by the marked refraction and their size. The basophile granules of the mast cells appear dark blue. The nuclei of the erythroblasts are also dark blue. Blood platelets appear as small blue structures. This stain is applicable to Fonio's technic and also for malarial plasmodia. If thick smears are desired, the solution is applied two hours after the preparation of the slide, whereupon hemolysis results after a few minutes. The smear is then washed with distilled water and again stained with a more dilute toluidin solution (1:20). The stain is allowed to run off and the specimen is dried in the air. This technic shows up more leucocytes to the single visual field than the former one and is useful for rapid orientation.

Action of the Commoner Ecbolics in the First Stage of Labor.—M. Pierce Rucker (*American Journal of Obstetrics and Gynecology,* February, 1922) reports observations on twenty-one patients with a Voorhees bag in the cervix during the first stage of labor. The stem of the bag was connected with a mercury manometer and graphic records of the uterine contractions thus obtained. The effects of various drugs on the contractions in the first stage of labor were tested. Hyoscine in doses of one two hundredth to one one hundredth grain seemed to exert a moderate but rather constant ecbolic action. The observations confirmed the clinical impression that the first stage of labor is usually shortened by the use of scopolamine or hyoscine. Among the six patients to whom quinine was given, usually orally in the dose of ten grains of the sulphate, the action was variable; sometimes it markedly strengthened the normal rhythmic contractions, while sometimes it showed no action whatever. In the single instance in which one thirtieth grain of strychnine was given hypodermically there was a moderate increase in both the strength and duration of the pains. Castor oil, two ounces orally in one case, seemed to have no effect. A five minim dose of ergotol hypodermically in one case was followed by a slight increase in the rapidity of the pains, with a lessening of their strength and duration. Another patient at term was given ten minims of ergotol by mouth with no appreciable effect; possibly the specimen of ergotol used was inert. In the three cases in which pituitrin was used in doses of from two to seven and one half minims, an incomplete tetanus of the uterus followed in from two to four minutes and continued from nine to thirty-five minutes. The most marked effect followed the use of two minims of pituitrin in a patient at term; it did not last as long, however, as when seven and one half minims were used in a case of premature labor. The prolonged incomplete tetanus following the administration of pituitrin in these patients appears to explain the many disasters that have followed its use.

A New Method of Injecting Tuberculin in Disseminated Tuberculosis of the Skin.—W. Böhme (*Wiener klinische Wochenschrift,* February 23, 1922) asserts that the Ponndorf method of inoculating the skin by the inunction of the antigenic material into the uppermost layers of the skin is entirely different from every other method of its application. The skin inducts the tuberculin into the circulation and the tuberculous foci in a rational and neutralized form, without diminishing its therapeutic effect and even enhancing it. The skin acts like a filter. Two substances, A and B were used for inoculating purposes: A contains all the specific antigenic substances, such as the metabolic products developed in the nutrient medium from growth of the bacillus as well as the stored up bacillary groups of substances in concentrated form derived from autolysis by the avoidance of chemical or thermic uncontrollable manipulations; B represents the inoculating substance enriched by specific antigens of the excitant of mixed infections (streptococci, staphylococci, pneumococci, etc.). The dosage depends upon the number of the inoculation scratches, the size of the field of inoculation, the number of drops of the material used and upon the interval and total number of the inoculations. Marked curative effects are noted in the cases of preclinical tuberculosis, the groups of larval tuberculosis physically not recognized as tuberculous, the phenomena of tuberculous intoxication, and also in the heterogeneous conditions not directly related to tuberculous phenomena, such as erysipelas, certain neuroses, juvenile deafness, and rheumatism. The Ponndorf method of treatment has no relationship to proteotherapy. As ninety-eight to one hundred per cent. of all people show at least histological evidence of tuberculosis, the secondary nonspecific effect seen in nonspecific groups of diseases is only possible if based upon a strictly specific and tuberculous reaction.

Specific Treatment of Tuberculosis of the Eye by the General Practitioner.—Eduard Nowak (*Wiener klinische Wochenschrift,* March 2, 1922) asserts that before beginning the treatment the patient should undergo a complete and thorough physical examination and if only a latent tuberculous focus is found, with nothing else to account for the condition, tuberculin treatment is indicated. With negative findings, tests were made with O. T. to determine the presence of tuberculosis; this, however, is contraindicated with fever, cardiac and renal disease and in women shortly before and after the menses. The most frequent reaction is the puncture reaction, showing circumscribed redness and wheal formation after twelve to thirty hours, with a less frequently associated general reaction; focal reactions in the eye are the rarest. The treatment itself is begun with B. E. 0.001 mg., increased at the cost of half this dose in nonreacting cases, and in cases with marked reaction to O. T., by one fifth to one third. The dosage 0.001 mg. to 0.1 mg. is given subcutaneously, every two days and then 1.0 mg. every three days up to 10 mg. every four days. With larger doses, the intervals are still greater and the increases are only by one fifth to one third, but individualization is necessary. The aim is to reach the maximum dosage, if possible 0.1 to 1.0 gm. pure B. E. (absolute maximum dosage), but less may be sufficient (individual maximum dosage). The less the reaction, the quicker is the goal attained. If the absolute or a smaller individual maximum dosage is reached, the intervals are increased (8, 10 ,12, 14 to 28 days), given for months, so that the treatment may last for months and even years. The dosage is controlled by the febrile and general reactions. Local reactions may be avoided with the pure doses of B. E. by diluting it with physiological saline solution. Nonspecific remedies should also be used as adjuncts in the treatment. For general practitioners, especially those in the rural districts, the solution of B. E. can be properly diluted ready for use in series.

An Interesting Case for Diagnostic Röntgenography.—Holzknecht, Lenk, Pordes, Kriser, and Winternitz (*Wiener klinische Wochenschrift,* March 30, 1922) report a case which showed a fistula closely behind and below the greater trochanter. The question arose whether the focus of suppuration was in the right hip joint or in the sacrum. The röntgenogram without the use of a contrast medium filling the sinus revealed a destructive process with absorption and sequestration at the body of the first sacral segment, at its left and apparently anterior half, but the right hip showed no pathological condition whatever. The clinical examination gave no definite information as to the site of the involvement. A röntgenogram of the fistula filled with a contrast medium in the anteroposterior direction showed a sinus running obliquely inward and upward, with a short branch running toward the femoral neck, and the sinus then followed a straight course to the body of the second sacral vertebra where there was a cavity; the question of the involvement of the hip remained unsettled. A transverse exposure of the sacrum and hip with a contrast medium filling the sinus revealed the sinus to be behind the femur, running upward. The previously described branch of the sinus seen in the anteroposterior plate of the femoral neck, became lost in the main tract and therefore lay in the frontal plane. The sinus left the pelvis in the region of the great sciatic foramen and emerged near the great trochanter.

End Results in Obstetrics.—C. J. Andrews (*American Journal of Obstetrics and Gynecology,* May, 1922), going over 150 private case records, found a comparatively large number of instances of retroverted uterus at "discharge examinations" after labor. He urges that obstetrical cases should be not finally discharged until the uterus is in position, if this can be secured by simple office treatment. For replacing the uterus he uses a method suggested by J. C. Hirst in which the double tenaculum is first placed on the anterior lip of the cervix and the fundus released by gentle traction. The tenaculum is then held by an assistant, while the fundus is lifted and held forward by two fingers in the vagina. The assistant now pushes the cervix downward and backward, and thereby assists the other hand on the abdomen in catching the fundus and bringing it forward. This maneuvre makes it unnecessary to use the knee chest posture and is much more effectual and satisfactory. After the uterus is replaced, it is in some cases let alone, while in others a hard rubber pessary is used.

Proceedings of Societies

AMERICAN BRONCHOSCOPIC SOCIETY.

Fourth Annual Meeting Held in Atlantic City, N. J., June 1, 1921.

The President, Dr. Henry L. Lynah, in the Chair.

President's Address.—Dr. Lynah, in his address as president, said he thought that attention should be called to the object of the society. Members were wanted, particularly those practising bronchoscopy, direct laryngoscopy and esophagoscopy. Of course those members who were taking courses with Dr Jackson, Dr. Forbes or the chairman, became proficient in bronchoscopy, laryngoscopy or esophagoscopy in a short time, but it meant that they must practice for a long time after they received instruction. Among recent amendments to the constitution was one which provided that a man should present a thesis when applying for membership in the society, as in the American Laryngological and Triological, and that would now be required. It would also be a good plan to have each man present something on endoscopic work to show that he was familiar with the work on that subject. The remainder of Dr. Lynah's brief address dealt with the matter of changing the name of the society from the Association of American Peroral Endoscopists to American Bronchoscopic Society.

Bronchoscopic Cases of Dental Origin.—Dr. H. H. Forbes, of New York, read a paper on this subject which appears on page 738 of this issue.

Dr. Thomas H. Halsted, of Syracuse, in discussing the subject, cited a case in which a tooth was inhaled and remained in the lung fourteen years. The patient, a man over fifty, came to him, he said, two years ago, complaining of fetid expectoration, which was profuse. Suspecting a foreign body, inquiry was made regarding its possibility, but only after much questioning did it develop that cough followed extraction, under ether, of several teeth fourteen years before; his trouble evidently began at or about this time. An x ray was made, and, as in Dr. Yankauer's case, there was much difference of opinion as to whether the plate showed anything abnormal. Dr. Halsted said he thought he detected a shadow at the junction of rib and sternum, but the röntgenologist thought there was nothing abnormal. A second plate was not much more satisfactory but he was convinced there was a shadow, and advised bronchoscopic examination and removal if possible. Bronchoscopy, under ether, was done and a stricture with cavity beyond found, but the foreign body was not located. It was the most difficult bronchoscopy in many respects that he had had. Cough was uncontrollable, dyspnea serious and threatening, so that it was a relief to have him leave the table alive after an hour's fruitless effort. Dr. Halsted referred him to Dr. Chevalier Jackson, who saw him a month or so later. He confirmed the diagnosis, and operated, finding the stricture and cavity, but not the foreign body. He also had a very serious time with the patient. A second operation by Jackson six weeks later was more successful, dilating the stricture and removing a part of the tooth. A serious cardiac disturbance developed following the second operation, necessitating his being in bed for weeks. However, on a subsequent operation, Jackson removed more tooth particles, the patient making a satisfactory recovery, with loss of the fetid expectoration and cough.

Dr. Halsted cited a second case, which was suggested by Dr. Murphy's case of a foreign body remaining in the lung giving rise to no symptoms. A child, aged thirteen years, while holding a clasp brooch in her mouth inhaled it and it disappeared. This was three years before he saw her. There was no spasmodic dyspnea at the time of inhalation, and no cough. She was alone at the time and on her mother's return, an hour later, she was taken to the family physician, who found no evidence of its presence and suggested that it had been swallowed. The stools were watched for some days, without result. Nothing happened, and the girl went on without symptoms, though the mother, a trained nurse, was uneasy. During the following six months the child was taken to the doctor a number of times for examination, and was always assured that there could be no foreign body in her anatomy, and that it had doubtless been vomited and lost. For the first time symptoms developed six months ago, a wheezing with colds, lasting a few days. Three months ago the wheezing became definitely asthmatic. Foreign body was still unsuspected. The day before Dr. Halsted saw her she was taken to Clifton Springs Sanitarium, where an x ray was taken and showed a bar pin in the left lung, between the seventh and eighth ribs, the open point directed upward. She was referred to Dr. Halsted for operation. The diagnosis was clear. Under ether, upper bronchoscopy was done and two of the smaller bronchi found filled with granulation tissue beyond a stricture. Unable to see or grasp the pin a second operation was made a week later. The stricture was now dilated, the pin found and grasped and removed. It proved to be a clasp brass pin an inch and a quarter long. The pin was open, point directed upward. The child made an uninterrupted recovery, returning home at the end of a week.

Dr. Ellen J. Patterson, of Pittsburgh, said she had had one interesting case, a man, who came to her a year ago with a history of having had an attack of influenza in February, 1920, from which he had not recovered. A radiogram showed a lung abscess and a foreign body. When she looked at the plate she asked whether he had had any dental work done. He said he had had some teeth extracted about seven years before and that he also had had some work done in December, 1920. He was perfectly well until the attack of influenza, after which he lost weight, had profuse expectoration, and daily elevation of temperature. Before radiography the tentative diagnosis was tuberculosis with negative sputum. On bronchoscopy a tooth with an amalgam filling was found. The patient made a prompt recovery as far as his acute symptoms were concerned. He went to the Adirondacks for the summer and resumed his business in the fall.

Dr. Sidney Yankauer, of New York, said he had had two cases of foreign body of dental origin which were of special interest. One was that of a man who inhaled into the left upper lobe a dental broach. Numerous attempts were made to get the foreign body out, but without success. The surgeon in charge of the case finally decided to get at it by the external method. He did a thoracotomy and got the foreign body between his fingers, but before he could cut down to it the vessels at the hilum began to bleed, and bled so freely that he had to tie off the lobe and take the whole lobe out. The patient died. In the second case the patient had inhaled a portion of tooth which was extracted under general anesthesia. He told the doctor in charge this accident had happened but his statement was disregarded. He was sick for about three months. Finally he was told he had carcinoma and he was brought to Dr. Yankauer who bronchoscoped him and removed the foreign body. He removed the foreign body and granulations which had formed around it and irrigated the man's lungs at the same sitting. This was the only time he bronchoscoped him. The patient made a complete recovery in about six months. The interesting and instructive part about this case was the man had a stack of x ray plates two feet high and in none of them could one see any sign of a foreign body. After the foreign body was removed and its shape noted one could hold up the x ray plates and see the tooth in every plate. But the tooth cast such a weak shadow that it was confused with markings around the hilum of the lung.

Dr. John W. Murphy, of Cincinnati, said he thought it was rather remarkable that these cases were not seen more frequently considering the ease with which a foreign body could be inspired. When a foreign body of dental origin was inspired, if there were no symptoms the natural belief was that it had passed on into the stomach and no further attention was given to it. He had had two cases of this character; in both of them there were no symptoms whatever when the object was first inspired. In one case he had been consulted five days after the tooth had been lost during the extraction, but was supposed to have passed into the stomach as there were no symptoms of it being in the bronchi. However, an x ray at the end of five days showed the tooth located in the right bronchus just opposite the eighth rib. An attempt at removal was made under general anesthesia, but all the tubes were too short. The following day Dr. Iglauer was called in and with a longer tube the tooth was removed under local anesthesia. In a case which Dr. Murphy had seen recently, the clasp which was holding a molar tooth was inspired. The dentist was extracting it with some difficulty, when he dropped it from his forceps, and it disappeared. No symptoms whatever were present. On Dr. Murphy's advice an x ray was taken when the foreign body was discovered in the right bronchus opposite the seventh rib. The patient was a woman about sixty-four years of age, and she was rather reluctant to have even the x ray picture made of the foreign object. She came to the office and was given a local injection of morphine and atropine before getting ready to make the extraction. As the nurse was bringing her into the operating room she had a paroxysm of coughing and when she stepped into the room she handed Dr. Murphy the foreign body which she had coughed up. At no time had there been any cough or other symptom. He believed it was important that the attention of dentists should be called to the danger of this and the greatest caution taken in working about the mouth with fillings and foreign bodies as they are very apt to be inspired. When they were inspired they should not always think that they had passed into the stomach, but in every case he believed an x ray should be taken at once as the sooner these cases were seen and an effort made at extraction the more certain was success.

Dr. H. H. Forbes, in closing the discussion, expressed his appreciation of the kindly discussion of his paper. The last case had been presented as much for an opinion of the steps taken as to tell the result. When the foreign body, which was a portion of amalgam filling, was seen in the x ray picture, one realized how small a body one had to search for. Feeling that every moment the foreign body might work further and at the same time feeling that the possibilities of a solid body being coughed up were very small, he immediately passed the bronchoscope. Dr. Lynah and Dr. Imperatori had later seen a case with him and both felt that the second attempt was wise and this was done but he could not find the foreign body. If the patient had not coughed it up, or it had not disappeared, possibly fluoroscopic bronchoscopy would have been tried. He had used this method in a number of cases and Dr. Lynah had assisted in some of them; it worked out very well, and he believes the method should be made use of in these cases of very small foreign bodies. In reference to the gold crown: the dentist with whom the accident occurred told me he would never attempt to put on another gold crown without putting on a rubber dam.

Treatment of Suppurative Conditions of the Lung.—Dr. T. E. Carmody, of Denver, Colo., read a paper on this subject which is published in full in this issue of the Journal, page 742.

Dr. Henry L. Lynah, of New York, said he agreed with Dr. Yankauer about foreign body abscesses. They always improved, but not always got well for some years afterwards. Dr. Dean's assertion was correct. After the foreign body was removed, in about a month that patient was pronounced cured by many expert laryngologists, but if followed for a time it would be found that he was not cured. He coughed up pus and if bronchoscoped a stricture would be found. If bronchoscoped again and the stricture dilated he would eventually be cured. In a young boy with a tack in his lung, who had rib resection for drainage, it was a year after bronchoscopic removal that he had recovered. Dr. Forbes rapidly dilated the stricture before there was any improvement. The operation was done some two and a half years from the time Dr. Lynah saw the case; the patient recovered. Dr. Arrowsmith had had a very serious case in which the patient eventually recovered under the Yankauer treatment. Dr. Lynah said that the cases which had particularly impressed him were those in which the patients had suffered from stenosis of the bronchi. In some there was edematous stenosis, with granulations, which bled. He was not speaking of abscesses and erosion of vessels—but usually hemorrhage and ooze came from granulations. If the granulations were removed and the stenosis dilated the patients were bound to improve. As regards the injection of bismuth into these abscess cavities, this was never done until the case had been thoroughly aspirated and reradiographed. They tried to localize the abscess by that means and a lung absolutely soaked with pus could be cleared up. The patient should then be sent to the radiographer, and after localizing the abscess bismuth mixture injections are made, endeavoring to inject that bronchus from which pus is oozing. Dr. Yankauer mentioned that overflow of bismuth would go into healthy tissue. That occurred in early cases, but by making applications of flexible collodion leakage was prevented. Some would leak out of the bronchus or the main branch. In animals leakage occurred when the injections were made forcibly. Injections should never be made forcibly. The bismuth mixture should go in slowly, and the patient then turned on his side to allow the mixture to gravitate into the cavity. It disappeared much faster from the abscess cavity than from the lung structure. In regard to prognosis in these cases, patients must be followed from time to time as to the amount of expectoration before they can be pronounced cured. Dr. Lynah said he had thirty-eight cases. Out of the fifteen in which localization of the abscess had been studied by injection, nine of them followed tonsillotomy. If one got tonsillotomy cases early they cleared up early. Personally, he believed these cases were all aspiration pneumonia when seen early enough.

Dr. Sidney Yankauer said he thought that the cannula which he used for the injection was very easy to make and could not leak. Take an ordinary straight cannula and fasten a piece of wire so that it projected two inches beyond the cannula; over that put rubber tubing about the size of the tubing used over the ear pieces of spectacles. The wire acted as a guide and one could go into any one of the bronchi and it would not leak. He said that Dr. Carmody's paper had interested him exceedingly, but he thought one should distinguish between lung abscesses due to foreign body and those due to diseases of the lungs. The abscesses due to foreign bodies were much more amenable to treatment than those due to pulmonary disease and after the removal of the foreign body most of those abscesses had a tendency to get well spontaneously. The same thing was true in lung abscesses following tonsillectomy, in a large number of which the patients recovered. Investigations made at Mt. Sinai Hospital showed that the lung abscesses following tonsillectomy usually occurred nine or ten days after the operation, and this happened with such regularity that they assumed that there was a specific organism which caused them, but it had not yet been isolated. Many of these patients got well and it might be, as Dr. Mosher said, that everybody was not as truthful as the Boston men, because in private conversation with various men he had occasionally heard of a lung abscess following tonsillotomy. He thought there were many more such cases than had been recorded. The patients who got well after three or six months were not likely to get well spontaneously. They had succeeded by irrigation in curing cases of lung abscesses following tonsillectomy, which had existed as long as a year. The method which they used consists of repeated irrigation with iodine solution. He hoped to hear from Dr. Lynah what his latest experience had been. Personally he had been afraid to place a quantity of the foreign body into the lungs and in some of Dr. Lynah's cases the bismuth had not been deposited in the abscess, a good deal of it had run over into healthy lung and remained in the healthy lung much longer than it did in the abscess cavity and it would be extremely interesting to know what had become of it. If bismuth injected into lung abscess would act as a permanent antiseptic and help to cure these cases, it would prove to be a most valuable method. Perhaps other drugs could be used. He had tried once to inject a weak iodoform emulsion into these cavities and it created a marked reaction and he had not tried it since. The iodine solution, which could be increased in strength until it reached about 1-500, seemed to have given the best results, although the percentage of cases he had completely cured was very small. That was perhaps partly due to the fact that the patients referred to him had been given up both by the internist in the hospital and then by the surgeons. When they are beyond the reach of operation and the internist could do no more, Dr. Yankauer said he tried to cure by washing out. Most of the cases were of long standing, quite a number extensive bilateral bronchiectasis. They had succeeded in bringing about great improvement in these patients so that they could go back to work, coming in once in two weeks or once a month for bronchioscopic treatment.

Dr. Yankauer thought it might be of interest to state that these patients were always cocainized for bronchoscopies; it had not been possible to pass a bronchoscope without cocainization. The fact of greatest importance in this connection, however, was that the bronchoscopists were beginning to get hold of these cases, and if all bronchoscopists would impress upon internists in hospitals the value of bronchoscopic examination and treatment in the various pulmonary diseases, the usefulness of the bronchoscope would be greatly extended. Dr. Yankauer said he was convinced that in the future the main use of the bronchoscope would be for diagnosis and treatment of intrathoracic diseases, because the proper treatment for foreign bodies was the prophylactic treatment rather than the removal.

Dr. Lee W. Dean, of Iowa City, Iowa, said that the cases of chronic abscess of the lungs that he had treated had been referred to him by internists and they had been very proud of the results which were secured. As a matter of fact, with the exception of one case, in which there was a quadruple Wassermann reaction, and in those cases where a foreign body was present in the lung, the final results of treatment had been very poor. Our patients were all ex-urban and where no treatment had been given for two years the patients had had much discomfort. When the bronchoscopic treatment was continued the patients were much better.

Early Hodgkin's Disease.—Dr. Lee M. Hurd, of New York, reported a case of Hodgkin's disease in which endoscopy led to the diagnosis. (See page 746.)

Dr. Sidney Yankauer, in discussing Dr. Hurd's paper, said that the case was extremely interesting, particularly as it illustrated the value of bronchoscopy in chest conditions. They had been able to make diagnoses of pulmonary tumors in a number of cases—about eleven or twelve now. The extrabronchial tumors, such as this one was, were known to be very difficult to diagnose bronchoscopically, because one did not see the tumors and had to judge of the presence of a tumor by the manner in which it compressed the trachea and bronchi. Two interesting cases were seen in Mt. Sinai Hospital about two years ago. In one case a tumor was distinctly shown by the x ray, but the diagnosis could not be made. It lay between dermoid cyst or the mediastinum and a neoplasm. Dermoid cysts occur in the anterior mediastinum and malignant neoplasms in the posterior mediastinum. With the bronchoscope it was possible to ascertain that the pressure was made on the anterior wall of the bronchus and on operation the diagnosis of dermoid cyst was verified. Shortly after that a patient was sent into the hospital with a diagnosis of dermoid cyst. Radiographic picture could not state whether anterior or posterior of mediastinum. The bronchoscope in this case showed the tumor to lie behind the bronchus and dermoid cyst was excluded and the patient ultimately died and showed presence of malignancy.

It was quite possible, of course, to be mistaken in the diagnosis of such tumors. He mentioned particularly the fact that a lung abscess might sometimes exert pressure on a neighboring bronchus, not on the bronchus which entered into the lung abscess, but some other which it approached, and in this way the bronchus might be constricted by an abscess cavity. He had seen such a case and had the condition verified at autopsy. Sometimes large growths were observed over the lung in which diagnosis could be made without the bronchoscope, but in which, with the bronchoscope, one could see some interesting pictures. In one of these cases the right bronchus was so tightly compressed that the bifurcation of the trachea could not be seen, and it was only with the greatest difficulty that its location could be made out. It was a large tumor which filled the whole chest. Medical men should have impressed upon them that in these cases a great deal can be learned through the bronchoscope even in cases where the tumor itself cannot be seen. They must also learn to overcome their fear of bronchoscopic examination. In the early days of bronchoscopy many more accidents happened than now. Nowadays with large numbers of men doing bronchoscopy skilfully and under local anesthesia the examination did not greatly incommode the patients; it did not hurt them at all, and the medical men should be impressed with that fact.

Dr. Henry L. Lynah, of New York, said that the subject of mediastinal tumors was exceedingly interesting. He had seen five such cases of mediastinal tumor. In one case they did not have a tracheotomy tube long enough and used a rubber tube and passed it down and turned the tube to the right as far as possible, getting the rubber tubing into the right main bronchus. These tumors were absolutely inoperable.

Dr. H. H. Forbes, of New York, said he thought the subject was very interesting and it brought up a case of a nurse who gave a positive blood picture of Hodgkin's disease. She was having difficulty in swallowing. The interesting possibility was pressure of enlarged glands not seen by x ray. In addition to the difficulty in swallowing, there is an adductor paralysis of both cords. Bismuth paste by esophagus went down pretty well until the crossing of left bronchus, and at that point there was the beginning of a pouch formation. Whether there was a pouch and tumor and blood change or enlarged mediastinal glands they did not know.

Result of the Use of Heat Hyperemia in Esophageal Stricture.—Dr. Lee W. Dean, of Iowa City, Iowa, read a paper on this subject.

Dr. Robert C. Lynch, of New Orleans, in discussing Dr. Dean's paper said he had been dilating these strictures for the last seven or eight months. He reported the case of a little girl with five strictures in which he had dilated, or had attempted the dilatation by forcible means, working her up on two occasions to No. 35 Mosher's instrument, and keeping her under dilatation daily for a period of time, packing the ordinary wax bougies every day for a period of three or four weeks, on account of some family disturbance the routine of bringing the patient back to the hospital was broken and the little patient was allowed to go for three or four weeks. When the esophagoscope was put in and by working up to dilatation so that the child could eat soft food comfortably, something occurred in the household which prevented her returning. Then dilatation with heat bougies to 45° was started and an esophagoscope was put in. It was found that while the thermometer registered 45° the bougie did not seem to be nearly so hot and after a little while it was found that the esophagoscope began to get quite warm. The esophagoscope was really getting most of the heat and the consequence was the heat was being distributed above the stricture, not in it. Feeling that it would be possible to get down to the stricture with the naked dilator without the aid of the esophagoscope, knowing the lay of the land, they put in the dilator and ran the heat up to 45° C. and kept it there for half an hour. The patient was very tractable, she did not seem to mind manipulation very much. She would lie with secretion running out of her mouth, so that we had evidences of marked increase in the secretions and considerable edema produced around the stricture. After the application for half an hour of this hot dilator, she was esophagoscoped and the area of the upper portion of the stricture was found to be edematous. It was too small to permit the esophagoscope to get through. After using this for a period of say every other day for about two weeks it seemed to us that the strictures remained open for a much longer time. That is, the intervals between dilatation could be lengthened very much and the patient still kept on soft food. She had reached the point where she had gained materially in weight and was on semisolid food. She could eat boiled rice now and coarse grits and soft boiled eggs and things of that sort without difficulty. When she first came only water would go through and she was much emaciated. In her case the heat had helped materially. Dr. Lynch said that they had had four other cases of esophageal stricture and all patients were still living. In these cases the heat had softened the tissues much more rapidly than was possible by other means. The process was simple under the guidance of the esophagoscope. These cases were coming nearer to what was felt to be a cure than any he had treated previously, so the heat seemed to be of distinct value in cases of this kind. In two cases of stenosis of the larynx, where the strictures were small, he got a fairly large opening through the larynx and attempted absorption of this tissue by heat. The bougie was kept in the larynx for forty-five minutes at a time, running the temperature up to about 45° C. There was not much edema, apparently no reaction or disturbance either by perilaryngic or periesophageal irritation, and no evidence of esophageal irritation.

Dr. Sidney Yankauer, of New York, said he had not used this hot bougie, but he intended to use it on a stricture the kind which he was sure that no one present had ever seen. About six months ago Dr. Lilienthal at Mt. Sinai performed an entirely new operation for the removal of carcinoma of the esophagus and this had been an entirely successful method of accomplishing this very difficult and dangerous object and it was Dr. Yankauer's belief that it would be the coming operation for cancer of the esophagus. The operation was performed in the following way: First, a large flap of skin was laid across the back about two inches or more wide, and turned over, then an incision was made through three or four ribs along the spine and one of the ribs was removed for a distance of a few inches, then the posterior mediastinum was entered extrapleurally between the pleura and spine and the esophagus found, separated from the pneumogastric nerve and then the skin flap was turned into the wound behind the esophagus, brought around in front of the esophagus, out towards the other side of the wound, surrounding the esophagus and cancinoma with a layer of skin, the skin side next to the esophagus. This was left in place two or three weeks. The flap had granulated, the exposed portion of the esophagus containing carcinoma was well separated from the rest of the mediastinum. Then the esophagus was cut off above and below and the portion containing the carcinoma removed. When the wounds had granulated the flap was cut off at the base and the entire wound allowed to granulate. Following this operation a stricture occurred at the upper end of the skin flap. Dr. Yankauer esophagoscoped the patient and was able to locate the stricture, but owing to the peculiar twists and turns of the esophagus and the dense fibrous tissue it was impossible to pass the esophagoscope into the skin portion of the stricture and get below, but there was a fistula which opened into the back and through this fistula one could readily inject nourishment into the stomach, so there was apparently no stricture below. It was impossible to dilate this stricture. Dr. Lilienthal was forced to open the wound in the back and excise a stricture and this was apparently successful and the wound granulated. At the time this report was made the patient was able to swallow semisolid food. The wound in the back had not quite closed. The operation was quite a feasible one for a man as familiar with thoracic surgery as Dr. Lilienthal, and the patient stood it very well. He happened to be a comparatively young and strong individual and the carcinoma was taken at a very early stage. In an attempt to do this operation a second time, in a much older man and with a more extensive field, the patient died. I wish to call your attention to the fact that this operation is possible.

Dr. Henry L. Lynah said that in speaking of Dr. Lilienthal's case Dr. Yankauer had forgotten to say that no gastrostomy had been performed on the patient whatsoever. It was one of the most remarkable cases he had ever seen.

Dr. William B. Chamberlin, of Cleveland, asked Dr. Dean whether in dilatation, with preceding hyperemia, there was less danger of a minute or even a large tear in the stricture and elimination, in whole or in part of the danger of mediastinitis, with which they were so frequently confronted in these cases? He said he had had unfortunate results in a number of cases and was hesitant about treating strictures of the esophagus. On the other hand, there was no alternative but he approached these cases with fear and trembling because he never knew what would happen. In a recent case he dilated a lye stricture; the girl had had a previous dilatation with no untoward results. Five days later after dilatation under direct vision, with small and then with larger sized bougies, she manifested severe pain and a temperature of 105° or 106°. He thought she was going out with a mediastinitis. Ultimately she recovered. If these suggestions of Dr. Dean's would prove fruitful in eliminating this danger it would seem to be a great gain.

Dr. Harris P. Mosher, of Boston, said he thought the society should pass a vote of thanks to the genitourinary men for the number of instruments they had furnished the bronchoscopists. He took for granted that Dr. Dean made a preliminary examination of the stricture with the esophagoscope before he treated it with heat. He felt that all strictures should first be examined with the esophagoscope and their nature determined. This guided all subsequent treatment. It was his opinion that they could probably make a better start and get along faster by first employing forcible dilatation. This done he favored the use of the heated bougie. He was especially pleased to find that a new form of therapeutics was coming into esophagoscopy and esophageal surgery. He had long hoped that they might escape from the category of mere foreign body catchers.

Dr. Lee W. Dean, in answer to Dr. Mosher's question, said that all their esophageal cases were examined with the esophagoscope before a diagnosis was made. All their cases of fibrous stricture of the esophagus were first dilated under direct inspection. In the case where the unheated flexible bougies had been used, the strictures were first dilated under direct inspection, and as soon as the stage was reached where no progress was made, then the heated bougie was used. They had no filiform bougie that could be heated, consequently the heated bougie could not be used in very minute strictures. The heated bougie softened the tissue so that the stricture could be dilated, either with the heated or the unheated bougie. In answer to Dr. McKinney's question, he said that the heated bougie should give the best result in recent fibrous strictures. This was also true in the treatment of urethral strictures. He had not had an opportunity to try these bougies on a recent fibrous stricture of the esophagus. The younger the stricture of the esophagus the more rapid was the resolution with the use of the heated bougie. Children did not object to this treatment as mentioned by Dr. Lynah. It was necessary to use a mouth gag with them, otherwise they might bite the bougie and ruin it. Recently in a child of about eight years of age the use of the heated bougie resulted in a rapid dilatation of the stricture. In this case after several weeks of treatment with the nonheated bougie they were not able to secure a good result. In one adult case of fibrous stricture of the esophagus a good result was secured in fourteen days' time. Dr. Dean said he believed this electrically heated bougie was that it was a very good thing. He was glad to have Dr. Lynah express the same opinion. He thought in every case where it was desirable to avoid any reaction in the esophagus that the heated bougie should be used first at a very low temperature and for a short time and that the temperature of the bougie and the length of the treatment be gradually increased. They had one reaction when the temperature of the bougie was too high. There was marked edema and swelling in the esophagus. This lasted, however, only about twelve hours when the esophageal opening became patent again.

Pneumoperitoneum as an Aid to the Diagnosis of Cardiospasm.—Dr. Samuel Iglauer, of Cincinnati, read a paper on this subject. It is published in full on page 745 of this issue.

Dr. Harris P. Mosher, of Boston, in discussing Dr. Iglauer's paper, said that he thought it was one of the final links in the chain of proof that an upper abdominal infection was one of the causes of cardiospasm. In reviewing ten cases of cardiospasm he had found that stricture was present in nine of them. In these cases, therefore, stricture and not spasm was the chief cause of the condition called cardiospasm. Anatomical and fluoroscopic studies had shown that the upper edge of the left lobe of the liver made a crease in the front face of the esophagus. It could often be seen in the esophagoscope as a crescentic mounding into the right half of the field. The lower end of the esophagus was practically surrounded by liver. The subdiaphragmatic esophagus lay in what could be called a liver tunnel. The shape of this determined the shape of the lower end of the esophagus. If the tunnel was narrow the lower end of the esophagus was narrowed and coneshaped, if the tunnel was wide, the esophagus flared and opened freely into the stomach. He believed that cardiospasm was due in the majority of cases to an inflammatory process involving the liver tunnel which resulted in some cases in a nearly complete weblike stricture at the beginning of the liver tunnel, in other cases in deformity of the whole of the tunnel. The liver tunnel was a peritoneal pocket which lodged beside the subdiaphragmatic esophagus the lesser omentum. Deformity of the liver tunnel was probably due to adhesions resulting from infection of the lesser omentum. It would be found that many cases of cardiospasm gave a history of some abdominal infection, like disease of the gallbladder or even of a general peritonitis.

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Letters to the Editors.

A WARNING.

New York, *June 1, 1922.*

To the Editors:

Some weeks ago a tall dark young man with gold plated teeth called to see me, saying that he was the son of Dr. Albert H. Freiberg, of Cincinnati, and that while in the railroad station his ticket for home had disappeared, and he was anxious for me to assist him.

Dr. Freiberg is an old friend of mine, and the young man spoke so glibly about visiting Dr. Lovett, in Boston, and various other doctors, all of them my acquaintances, that I foolishly advanced him some money without enquiring over the long distance telephone from his father to corroborate the young man's statement. I subsequenlty learned from Dr. Freiberg that his son had not been out of Cincinnati. A few days ago I learned from Dr. Henry C. Coe, that a young man calling himself Dr. O. W. Freiberg, with the address of 3670 Nebraska Street, Cincinnati, had called on him and borrowed some money to get home.

Thinking he may be going the rounds of the medical profession, I am writing you this letter with the request that you publish it in order that if he approaches anyone else he may be apprehended.

Reginald H. Sayre.

HOME FOR AGED PHYSICIANS

New York, *May 31, 1922.*

To the Editors:

On page 687 of the *Medical Record* for April 22d I find a report upon my remarks at Albany relating to the Home for Aged Physicians. There is a misquotation which will be quite shocking to the hundreds of physicians who are annual contributors to the benefaction for their colleagues who are in distress. The statement is made that "physicians in need of a home might be sent there provided those who send them paid the bills." Hardly anything could be more out of tune with our purposes than such a statement. Physicians in need of a home do not have to pay a cent for their care if they are destitute and their bills are paid by those of us who have decided to be kind to our brothers. None of the officers of the Physicians' Home receive any salary and we are working overtime and at personal loss to ourselves because the profession as a whole is too busy to waken up to an appreciation of what we are trying to do for it in the way of kindly deeds.

If there is any physician who has been in good regular standing and who is now in need of a home, he may come to us this very day and be sent to a place where the birds are singing and the trees in flower. He may go fishing or go to church or do anything that his strength allows him to do without feeling restriction of institutional method.

Robert T. Morris.

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NEW YORK, WEDNESDAY, JUNE 21, 1922

Miscellany.

Rectal and Vesical Incontinence Relieved by Operation.—Sheldon and Heller (*Annals of Surgery,* January, 1922) report a case of urinary incontinence and as a result of their operative findings conclude that in future they will investigate the position and shape of the bladder in all such cases. Their experience in this case and in two others of a similar nature prompts them to record the mistakes which they made in performing their first rectal operations. 1. The fibres of the gluteus maximus should not be severed, but should be detached with the periosteum at the site of insertion on the femur; 2, the muscle flap should be ample, at least an inch in diameter—even in children; 3, if possible, the nerve supply of the muscle flap should be investigated, and retained even if a large portion of the muscle must be incorporated in the flap.

The Method of Obtaining Unmixed Native Leucocytes.—Wilhelm Starlinger (*Wiener klinische Wochenschrift,* February 23, 1922) describes the following technic for obtaining human leucocytes almost without admixture of disturbing erythrocytes under conditions which completely maintain their native character: about 4.5 c. c. of blood are aspirated into a paraffined syringe and poured into a test tube containing 0.5 c. c. of five per cent. sodium citrate solution without foaming, and agitated for ten to fifteen minutes to test the power of sedimentation. Patients with diseases accompanied by albuminous degeneration are the best donors, as they provide large amounts of fibrinogen. If the spontaneous sedimentation proceeds within this time, showing a broad strip of plasma, the plasma together with the leucocytes is pipetted off into another tube. If sedimentation does not occur, a rapid and thorough centrifugalization is done and then a portion of the plasma is replaced by a solution of human fibrinogen (preferably), but if the human variety is not available, animal fibrinogen may be used. The amount of the fibrinogen to be added depends upon the fibrinogen concentration and the salt content: the greater the abundance of the fibrinogen and the less the salt, the less is required. The mixture is then again thoroughly shaken: the plasma, in both cases, contains erythrocytes in addition to the leucocytes. The elements in suspension are then removed by moderate centrifugalization and washed with an equal volume of physiological saline solution, under only moderate agitation and sedimentation: whereas formerly the erythrocytes agglutinated and underwent sedimentation, the reverse now occurs, the leucocytes now sedimenting in small clumps as a snow white deposit and the erythrocytes remain in the solution. Under the microscope, the heat from the reflecting mirror is sufficient to produce ameboid movement in the leucocytes.

Succinic Acid in the Cyst Contents of a Glioma.—Albert Corvin (*Wiener klinische Wochenschrift,* February 23, 1922) reports the case of a female, who was suddenly seized with an excruciating headache, nausea and vomiting, which persisted for three months with slight remissions; vision gradually became weaker, the gait became uncertain and there were lapses of memory. An ophthalmological examination revealed a choked disc in both eyes with foci of retinitis and paralysis of accommodation. The neurological examination showed a slight facial paralysis, absence of the lower abdominal reflexes and exaggerated reflexes in the lower extremities and a very slight paresis of the left upper and lower extremities and slight ataxia. The röntgenogram of the head disclosed a severe grade of increased intracranial pressure and erosion of the dorsum sellæ. A cerebral tumor was diagnosed but not located. The blood showed three plus Wassermann reaction and the spinal fluid reaction was negative, but there was a high cell count with positive luetic gold sol and mastix reactions; the lymphocytosis suggested the presence of a gumma of the brain. The necropsy revealed a cystic tumor in the right temporal lobe, just beneath the cortex, containing abundant yellow fluid and communicating with the lateral ventricle which was dilated. As an echinococcus cyst was suspected, the pyrrhol reaction for succinic acid was tried and found strongly positive. The histological examination of the cyst wall showed a cystic degeneration of a glioma. The combination of glioma and syphilis is exceedingly rare.

Intravenous Autoserum Therapy in Serum Disease.—Cesar E. Pico (*Semana Medica,* March 2, 1922) reports uniformly excellent results by his method which is as follows: Ten c. c. of blood is aspirated from a vein of the patient and allowed to coagulate. After five or six hours one c. c. of the serum is given intravenously, repeated every six to eight hours. Usually one or two injections are sufficient, and no untoward effects attended the method in twenty cases, while the itching, pain and other symptom of serum disease disappeared in a few hours, with a sudden drop in temperature. Six cases were given the autoserum treatment by the intramuscular or subcutaneous route without appreciable results.

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